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DISEASES CAUSED BY BACTERIA AND FUNGI.

ARNOLD, T. F. (1932). **Strangles. Part I. Clinical Observations.**—*J. Roy. Army Vet. Corps.* **3.** 65-74.

The opportunity of studying the disease was afforded the author while holding the appointment of veterinary officer at the Mona Remount Depot, in the Punjab, India. A large number of young horses and mules are collected annually in this depot and remain there until about four years of age. The disease has been a most troublesome one for many years, being responsible for a large number of deaths and, in recovered cases, to a considerable loss of efficiency due to debility and affections of the respiratory organs, such as broken wind and roaring.

Efforts made by previous veterinary officers to deal with the disease are reviewed and it appears that the only method which had met with any success had been the early isolation of affected animals.

The anatomy and pathological changes of the pharynx, guttural pouches, etc., are detailed at some length, as also are the usual medicinal agents employed. The author claims that intratracheal medication gave consistent and satisfactory results. Two mixtures were employed :—

(1) Oil of eucalyptus, guaiacol and chloroform, of each 2 drachms ; turpentine and oil of sesame, of each 1 ounce.

(2) Iodine 1 part, potassium iodide 5 parts and distilled water 100 parts.

The dose of each is from 5 to 15 c.c., injected between the tracheal rings as near to the cricoid cartilage as possible. It is most essential that none of the medicament be injected subcutaneously as if this occurs abscess formation is almost certain to follow. To avoid this the needle is washed out with a little distilled water or normal saline solution before withdrawal. The first mixture had a profound influence on nasal catarrh and the second on affected glands.

—C. J. R. LAWRENCE.

COOLEY, L. E. (1932). **Dissociation of Streptococci.**—*J. Infect. Dis.* **50.** 358-366. 3 figs. [16 refs.]

The author has attempted the dissociation of six strains of streptococci. In two cases he has been able to obtain an R form and in three cases an SR variant, commencing in each instance with the S form. The R and SR varieties were revertible to the S form by passage through dextrose broth ; young colonies of one R variant showed definite bacillary forms. The majority of the variants showed no change in virulence for mice, but one R form was definitely more virulent for mice than the corresponding S form.—NORMAN HOLE.

GOODNER, K. (1931). **The Development and Localization of the Dermal Pneumococcic Lesion in the Rabbit.**—*J. Exp. Med.* **54**. 847-858. 2 tables, 1 chart. [5 refs.]

An attempt has been made to analyse the factors involved in the development of the dermal pneumococcic lesion in the rabbit. As in previous experiments, inoculations were made intradermally with 0.2 c.c. of an 18-hour blood broth culture of Type I pneumococcus.

It is shown that the oedema fluid contains an antithrombic substance probably derived by autolysis from the pneumococci. The direction in which the lesion spreads is determined by gravity. The distance that it travels and the local tissue characters influence the amount of fluid which accumulates: inoculation at a point near the dorsal midline results in a large accumulation ventrally, inoculation ventrally in a comparatively slight lesion.

Intracutaneous injection of immune serum ventrally to the point of inoculation delayed the spread. Thromboplastin by the same route had a similar effect. When given intravenously at about hourly intervals for six hours it almost entirely arrested the spread of the lesion; within two hours of its discontinuance the oedema fluid began to move at the usual rate. An acceleration of spread occurred when *Haemophilus influenzae* was used as an associative infective agent.

—A. W. STABLEFORTH.

LE GUYON, R. F. (1931). Etude comparée de la sérosité péritonéale après inoculation de *Pneumocoque* chez un animal sensible et chez un animal à peu près réfractaire. [**A Comparative Study of the Peritoneal Exudate following Inoculation of *Pneumococcus* in a Susceptible Animal and in one nearly Refractory**].—*C. R. Soc. Biol. Paris*. **108**. 45-47.

Twenty mice and ten guinea pigs were inoculated intraperitoneally with 0.2 c.c. and 2.0 c.c. respectively of a glucose broth culture of a strain of pneumococcus which had previously been passed in mice and on blood agar. In the mice the pneumococci multiplied rapidly during the first four to six hours and the cellular reaction was intense; all succumbed to a septicaemia within 20 hours. In the guinea pigs, after four and six hours pneumococci were still few and cellular reaction was practically absent. After 20 to 25 hours the pneumococci had become numerous and a corresponding cellular response had developed. Certain animals died on the 11th or 12th day.

It is concluded that the refractory state of the guinea pig towards pneumococci is probably a humoral phenomenon.—A. W. STABLEFORTH.

I. DAWSON, M. H., & SIA, R. H. P. (1931). ***In vitro* Transformation of Pneumococcal Types. I. A Technique for inducing Transformation of Pneumococcal Types *in vitro*.**—*J. Exp. Med.* **54**. 681-699. 7 tables. [8 refs.]

II. SIA, R. H. P., & DAWSON, M. H. (1931). ***In vitro* Transformation of Pneumococcal Types. II. The Nature of the Factor responsible for the Transformation of Pneumococcal Types.**—*Ibid.* 701-710. 3 tables. [9 refs.]

I. In previous publications Dawson has confirmed GRIFFITH's original observation that type-specific S pneumococci may be transformed from one specific S type into other specific S types by *in vivo* methods. It is now shown that such transformation may be brought about somewhat similarly by *in vitro* methods viz. by growing small inocula of R forms in media containing vaccines prepared from heterologous S cultures. The change was most readily induced in media

containing anti-R serum, but occurred in its absence provided that blood or normal serum was added to the culture medium. The degree of heating to which the vaccine could be subjected without loss of its properties was similar to that found for *in vivo* methods. Serial subculture was unnecessary. The new S forms were obtained by repeated platings from the original culture and commonly appeared after two to three days, increasing up to four to six days. Subcultures retained their newly acquired characters.

II. R cultures possessing only slight degrees of stability were found most suitable for transformation *in vitro*, as *in vivo*. Vaccines prepared from old broth cultures or from cells disrupted by alternate freezing and thawing were ineffective. The supernatant from S vaccines, cell-free extracts and purified soluble specific substance were also ineffective. In view of the heat lability (at about 80° C.) of the factor concerned in transformation it is considered unlikely that it is related to the soluble specific substances. Its similarity to the antigenic specific substance of DAY is discussed.—A. W. STABLEFORTH.

COOPER, Georgia, ROSENSTEIN, Carolyn, WALTER, Annabel, & PEIZER, Lenore. (1932). **The Further Separation of Types among the Pneumococci hitherto included in Group IV and the Development of Therapeutic Antisera for these Types.**—*J. Exp. Med.* 55. 531-554. 4 tables. [13 refs.]

In a previous article, COOPER, EDWARDS and ROSENSTEIN reported that 58 per cent. of pneumococcus strains from lobar pneumonia in adults which did not fall into Types I, II or III had been classified into ten types termed Types IV to XIII. The present authors have examined a further 278 strains from lobar pneumonia in adults and 136 from lobar or bronchial pneumonia in children and have extended the number of recognized types in the so-called Group IV to 29, Types IV to XXXII, most of which gave very slight cross-reactions. Only a small percentage of the pneumococcus strains isolated in New York City for their study were left unclassified.

The relative frequency of the several types in adults, in children and in normal individuals or those suffering from respiratory infections other than pneumonia are discussed. The potency of therapeutic antisera and virulence of strains for mice are also considered.—A. W. STABLEFORTH.

PETRIE, G. F., & MORGAN, W. T. J. (1931). **A Quantitative Analysis of the Lethal Power of a Strain of Type I Pneumococcus.**—*Brit. J. Exp. Path.* 12. 447-460. 10 tables, 1 chart. [9 refs.]

Mice weighing from 15 to 20 g. were used and in all except the earlier experiments, which showed an unequal resistance in various stocks of inbred mice, were selected at random from a mixture of approximately equal numbers from different sources which had been allowed to mix naturally for from 10 to 15 minutes. They were then put into separate compartments. Each was inoculated intraperitoneally with 1 c.c. of a dilution of an 18-hour broth culture and observed at four-hourly intervals for 100 hours. Horse meat infusion with 2 per cent. proteose peptone was found to be the best culture medium and undiluted broth as satisfactory a diluent as any.

As regards the test animal, there was no sex factor and the mortality in a group of mice weighing from 20 to 24 g. was similar to that of groups of standard weight, although the survival time appeared to be lengthened. About 5 to 10 per cent. of mice possessed an innate resistance to small doses. Pneumococci recovered from resistant mice gave evidence of high virulence on reinoculation.

A characteristic curve relating dosage to percentage mortality was obtained

and, it is believed, furnishes evidence that an average lethal dose of culture can be calculated by the use of reasonable numbers of mice; this dose contains one diplococcus. The percentage mortality, the mean death time and the distribution of deaths in appropriate time intervals in a group of mice which receive a definite dose of a test culture, preferably of the order of $1/(100 \times 10^6)$ to $1/(500 \times 10^6)$ c.c., are criteria by means of which the lethal power of any culture of Type I pneumococcus may be specified. In relating the dosage and the resulting infection, data from 1,822 mice were analysed. The course of the disease in mice which received $1/(3,200 \times 10^6)$ to $1/(16 \times 10^6)$ c.c. was similar, suggesting that the numbers in doses within this range, 1 to 50 diplococci, possess the same lethal action. The critical level of lethal intensity seemed to be a dose of $1/(10 \times 10^6)$ which killed 75 per cent. of 769 mice. Control seedings of serum broth titres showed that all doses under $1/(800 \times 10^6)$ probably contained only one diplococcus.

—A. W. STABLEFORTH.

THOMAS, R. M. (1932). **The Diphasic Nature of Tuberculosis in Rabbits after Intravenous Inoculation with Bovine Tubercle Bacilli.**—*J. Exp. Med.* 56. 185-202. 7 figs. [9 refs.]

The author has recorded observations when a large group of rabbits is inoculated intravenously with bovine tubercle bacilli. The mortality rate showed two distinct phases; the first phase reached its peak at the end of the first month, the other reached its peak at the fifth month, with an intervening period at the end of the third month when the mortality rate was much lower than the general rate for the entire period. The number of fatalities in the first phase appears to be a function of the size of the dose. The two phases are characterized by different pathological findings. In animals dying within three months the spleen, bone marrow, lymph glands and liver were extensively involved, as well as the lungs and kidneys. In animals dying after three months, the lesions in the spleen, bone marrow, lymph glands and liver were minimal, whereas the lesions in the lungs and kidney were extensive. In addition, in the first three months the lesions were most frequently a diffuse infiltration of the organs with a mass of monocytes and epithelioid cells which showed a tendency to regress without caseation, while in the latter phase the formation of typical tubercles together with cavitation and fibrosis was more in evidence.

Studies of the blood cells during the course of the disease showed that the changes in the cells reflected the course of the lesions in the first phase when other signs were lacking. At the end of the first month there is an anaemia and leucopenia of all cells except monocytes. This fall in total numbers coincided with the increase of lesions in the bone marrow. During the second and third month the cells tended to return to their normal level coinciding with the recovery of the bone marrow. The most significant change in the monocytes was a qualitative one. During the chronic phase of the disease, a period of relative inactivity, studies of the blood cells showed few significant changes, although when the animal's resistance had obviously failed there was a decrease in lymphocytes with an increase in monocytes. This is suggested as a useful index or basis for prognosis.

Finally, it appears as if those animals which show least deviation from the modal blood count may survive longer than those whose counts are significantly high or low.—R. LOVELL.

NANU, I., JONNESCO, D., & STEFANESCO, C. (1931). Contribution au diagnostic de la bacillémie tuberculeuse par l'hémoculture selon la méthode de

Loewenstein. [Contribution to the Tuberculous Bacteriaemia Method of Diagnosis by Blood Culture according to the Method of Loewenstein].—*Presse méd.* Dec. 9th. 1805-1806. [13 refs.]

The authors review a list of cases in which LOEWENSTEIN or his colleagues have claimed to have isolated the tubercle bacillus by blood culture. Using the media and special technique of LOEWENSTEIN they record two positive cases from a total of 21 cases of clinical tuberculosis or rheumatism. One case was a tubercular pleuro-peritonitis, the other an acute polyarticular rheumatism with endocarditis and pericarditis. The culture from the latter case proved pathogenic for a guinea pig.

Direct search failed to reveal tubercle bacilli in four samples of pathological products, whereas when washed with 15 per cent. sulphuric acid and cultured on Loewenstein's medium, three of the cases proved to be positive.—R. LOVELL.

MILLER, F. R. (1932). **The Induced Development of Non-Acid-Fast Forms of Bacillus Tuberculosis and other Mycobacteria.**—*J. Exp. Med.* 56. 411-424. 1 table. [47 refs.]

The author has studied the question of whether there exists a non-acid-fast phase of the mycobacteria. Six strains of mycobacteria have been used, consisting of three human strains and one bovine strain of tubercle bacilli, one smegma and one phlei strain. These bacteria have been made to grow as non-acid-fast organisms by the addition to the culture media of a filtered extract of a human chromogenic strain of tubercle bacillus (H-37). The extract appeared to produce accelerated growth of the treated culture followed by differentiation into non-acid-fast forms. These bacterial forms were pleomorphic, usually consisting of cocci and small rods; branching forms and spore-like bodies also developed. The author argues that, by the addition of this extract which has been filtered through a Berkefeld filter and which contains no living bacteria, he has eliminated a possible source of error of added contaminants. Further, the extract was as effective after it had been autoclaved. He also points out that all the strains of mycobacteria used appeared to be in pure culture; they did not appear to contain in their original cultures more non-acid-fast forms than are usually found. All the organisms showed the same type of changes after addition of the extract and methods adopted to separate acid-fast from non-acid-fast by dilution of the culture were unsuccessful. After transfer back to a suitable medium, namely, Petroff's egg medium, four of the strains returned to acid-fast forms and showed the original type of growth. The author therefore concludes that it is reasonable to assume that the non-acid-fast bacteria were derived from acid-fast ones.

—R. LOVELL.

WAHBY, A. M. (1932). **New Medium and Treatment for Isolation of Tubercle Bacilli.**—*Zlb. Bakt. I. (Orig.)*. 123. 504-510. 2 tables. [41 refs.]

The author has described a new medium for the isolation of tubercle bacilli from material contaminated with saprophytic bacteria. The formula is as follows:—100 c.c. distilled water; 2 g. yeast extract; 2 g. peptone (Bacto) and 1 g. glucose.

This is heated in a steam sterilizer till the constituents are dissolved; a mixture of 10 g. of potato flour and 50 c.c. of cold distilled water is then suspended in the previous mixture, the whole being placed in a water bath. At a temperature of 50° C. the whole will "gel" and the yolks of eight fresh eggs are then added. After thorough mixing the medium is poured through gauze. 5 per cent. of glycerol and 3 per cent. of (1 per cent.) brilliant green are then added. The most suitable

pH appears to be 6.9 to 7.0 and after neutralization with caustic potash, the medium is tubed and sterilized on three successive days for one hour at 80° or 75° C.

The tuberculous material is mixed for 15 minutes with normal caustic potash, then centrifuged and the supernatant fluid poured off. The sediment is then mixed with 7 per cent. hydrochloric acid for 15 minutes and after 5 minutes centrifugation this sediment is spread out on to the medium.

It is claimed that this method kills vegetative bacteria except tubercle bacilli and the brilliant green in the medium prevents the germination of spores.

—R. LOVELL.

CALMETTE, & GUÉRIN. (1931). Vaccination anti-tuberculeuse par le B.C.G. Le B.C.G. peut-il reprendre de la virulence. [**Anti-tuberculosis Vaccination with BCG. Can BCG regain Virulence?**]*—Rec. Méd. vét.* 107. 531-533.

The authors have investigated a report by MOUSSU, who described a case of BCG vaccination which was followed by an abscess at the site of inoculation in which virulent tubercle bacilli were found. They point out that the animal was born and reared on a farm that was not free from tuberculosis, that it was not isolated and that it had been fed on raw milk. Furthermore, the abscess was 20 cm. from the site of inoculation. They therefore do not consider that the virulent tubercle bacilli found were connected with BCG vaccination.

—NORMAN HOLE.

RANKIN, A. C., OWER, J. J., SHAW, R. M., TALBOT, P. R., & VANGO, H. M. (1932). Studies on B.C.G. Vaccine. II. Non-Virulence and Resistance in New-Born Calves.—*Canad. J. Res.* 6. 177-191. 10 tables. [3 refs.]

In a previous paper [(1929). *Canad. J. Res.* 1. 48.] Rankin dealt with the resistance conferred by BCG vaccine against tuberculous infection and with its non-pathogenicity for calves over a period of one year. He also showed that the subcutaneous inoculation of calves with BCG conferred a marked resistance to subsequent inoculation of virulent tubercle bacilli as compared with non-vaccinated controls.

The present paper deals with experiments framed to assess the resistance to natural infection of calves vaccinated by mouth and to determine the virulence or non-virulence of BCG given by mouth to new-born calves. Seventy-six calves were employed in the experiments, half of which were given three doses (50 mg.) of BCG by mouth and half were kept as controls. These calves were divided into two groups each consisting of equal numbers of vaccinated and control animals. One group was used for ascertaining the resistance conferred by BCG against natural infection with tuberculosis and the other group to determine the virulence or non-virulence of BCG vaccine.

It was concluded that BCG is non-pathogenic for bovines and that when administered by mouth it confers a moderate resistance to natural infection. Calves vaccinated by mouth were found to be non-infective for susceptible control calves kept in contact with them. There was no evidence that BCG produced carriers of virulent tubercle bacilli.—T. M. DOYLE.

I. KERESTHETZIS, C., & ANGELO, A. (1931). Sur l'apparition des anticorps spécifiques chez les lapins inoculés par voie veineuse avec du BCG. [**The Appearance of Specific Antibodies in Rabbits following the Intravenous Inoculation of BCG.**]*—C. R. Soc. Biol. Paris.* 106. 1112-1113.

II. VAN BENEDEN, J. (1932). Sur l'état réfractaire à la tuberculose chez le

lapin prému ni au BCG. [The Immunity conferred on Rabbits inoculated with BCG].—*Ibid.* 109. 50-52. [3 refs.]

I. Keresthetzis and Angelo have confirmed the observation of NÈGRE and BOQUET that the intravenous inoculation of BCG (5 mg.) is followed by the appearance of specific antibodies which can be demonstrated by the complement-fixation test using the antigen of Boquet and Nègre.

II. The author states that the intravenous inoculation of 2 cg. of BCG conferred on rabbits a certain degree of resistance against an intravenous inoculation of 0.01 to 0.001 mg. of virulent culture of a bovine strain given seven weeks later. The subcutaneous inoculation of BCG did not appear to confer an equal degree of resistance to that which followed intravenous inoculation.

When the test dose was given subcutaneously to rabbits vaccinated by the intravenous or subcutaneous routes, Koch's phenomenon was not observed.

—T. M. DOYLE.

CERNAIANU, C. (1932). Ueber spontane Suipestifer-Infektionen bei Kücken. [Spontaneous *Bact. suipestifer* Infections of Chickens].—*Zschr. Infektkr. Haust.* 42. 297-299. 2 tables.

The author records two epidemics affecting chickens from which bacteria similar to *Bact. suipestifer* were isolated. His studies included similar bacteria isolated from swine and, although no detailed antigenic analysis is available, the bacteria behave as *Bact. suipestifer* when examined biochemically and by direct agglutination. The possibility of infection from swine is suggested as in one outbreak the chickens were fed with meat-meal prepared from a knacker's establishment, whilst in the other the poultry had had access to a large slaughter yard. It is pointed out that in the inspection of food for human consumption fowls as well as animals such as swine may thus be suspect.—R. LOVELL.

I. GWATKIN, R. (1932). Incidence of *Brucella Abortus* in the Fetal Membranes of Full-Time, Reacting Cows.—*Cornell Vet.* 22. 62-66. [6 refs.]

II. PLASTRIDGE, W. N., & McALPINE, J. G. (1932). Agglutinin-Absorption Studies on *Brucella*.—*J. Infect. Dis.* 50. 555-567. 5 tables. [17 refs.]

III. ROBERT-LEVY. (1932). Caractères d'identification d'une *Brucella* isolée en Meurthe-et-Moselle. [Identification of a Strain of *Brucella* Isolated in Meurthe-et-Moselle].—*C. R. Soc. Biol. Paris.* 109. 1212.

I. Gwatkin carried out a cultural and biological examination for the presence of *Br. abortus* of the foetal membranes of 36 full-term cows which showed a positive reaction to the agglutination test. *Br. abortus* was isolated from the foetal membranes of 5 and from the milk of 18 cows. It was observed that the organism was present in much smaller numbers in the placental membranes of full-term infected cows than is usual in aborted foetal membranes.

The author suggests that the udder may exercise a more important part in the dissemination of infection than is generally recognized.

II. Plastringe and McAlpine made a serological study of 142 strains of brucella of human, bovine, porcine and caprine origin. A comparison of these strains, based on their ability to utilize dextrose and their action on dye plates with their serological characteristics, showed that the agglutinin-absorption test failed in 15 per cent. of cases to differentiate between *Br. abortus* and *Br. melitensis*. The authors agree with BURNET that while it is possible to identify some strains of *Br. melitensis* by means of the agglutinin-absorption test, in the case of *Br. abortus* the test is unreliable.

III. Robert-Lévy records the isolation of the *Br. melitensis* from the first reported case of undulant fever in Meurthe-et-Moselle.—T. M. DOYLE.

- I. KLARIN, E. (1931). Undersökning över förekomst av *B. abortus* Bang i mjölk från kor, som kastat till följd av infektion med denna bakterie. [Investigations respecting the Occurrence of *Br. abortus* Bang in Milk from Cows which had aborted in Consequence of the Infection].—*Skand. Vet.-tidskr.* 21. 249-269. 6 tables. [Summary in English: abst. from orig.]
- II. TULLBERG, K. (1931). Undersökningar över sambandet mellan blodserumets agglutinationsvärde å ena sidan och mjölkens halt av abortbaciller å andra sidan vid sjukdomen smittsam kastning hos nötkreatur (Banginfektion). [Investigations of the Connection between the Agglutination Titres of the Blood Serum and the Percentage of Affected Cattle in which *Br. abortus* is Present in the Milk].—*Ibid.* 389-404. 6 tables. [Summary in English: abst. from orig.]

I. By inoculations into guinea pigs the author investigated the occurrence of *Br. abortus* Bang in milk from 60 cows which had aborted.

Nine tests were made from every cow from the 7th to the 150th day after abortion. Forty-three (about 70 per cent.) of the animals tested excreted the bacilli in the milk. The milk was usually infected with *Br. abortus* within a week after abortion and the bacilli were usually present in the milk for two months or longer.

The author finds that infection of the milk within a month after abortion is due probably to infection from the uterus, but that if the organism is not present in the milk until six to eight weeks after abortion the cow has in all probability been exposed to a fresh infection.

II. Milk from each quarter of 54 cows in two herds was inoculated into guinea pigs and agglutination tests were made with blood serum.

When the blood agglutination titre was 1 : 100 or more, *Br. abortus* was found in the milk in more than 50 per cent. of the cases ; when the agglutination titre was 1 : 70, it was found in 19 per cent. and when it was 1 : 10 to 1 : 20, only 3 per cent. of the udders were infected.—N. LAGERLÖF (STOCKHOLM).

WALL, S. (1932). Den smittsamma nötkreaturskastningens utvecklingsskede, bestämt dels med hjälp av sjukdomsberättelsen, dels med hjälp av blodprov från den smittade besättningen tagna 2 gånger i följd med en månads mellantid mellan blodprovstagningarna. [The Development of Bovine Contagious Abortion in a Herd as determined partly by Case Histories and partly from Two Blood Tests carried out at an Interval of One Month].—*Skand. Vet.-tidskr.* 22. 257-270. 8 tables.

The author has followed the course of bovine contagious abortion in a number of herds of cattle, carrying out agglutination tests with the blood serum and maintaining individual history sheets. He has thereby come to the conclusion that for the control of the disease it is necessary to ascertain definitely whether the disease is in the early stage, whether it is advanced to the stage when it is spreading in the herds or whether it is retrogressing.

In the early stage, isolation and stamping out is to be recommended. In the spreading stage, inoculation of the whole herd simultaneously with a dead vaccine later followed by inoculation with a live avirulent culture is recommended ; this causes a mild infection and according to the author shortens the spreading stage.

During the stage of retrogression it is possible, by means of blood tests and the

slaughter of infected animals, to eradicate the disease. The author utters a warning against the use of the stamping-out method of eradication unless all possibilities of infection from outside are eliminated. The tables are of considerable help for those studying bovine contagious abortion.—N. LAGERLÖF (STOCKHOLM).

- I. —. (1932). **Report of Committee on Bang's Disease.**—*J. Amer. Vet. Med. Ass.* **80**, 323-332. 1 table.
- II. COTTON, W. E., & BUCK, J. M. (1932). **Further Researches on Bang's Disease.**—*Ibid.* 342-355.

I. This report consists of recommendations for the carrying out of the tube agglutination test for the detection of cows infected with *Br. abortus*. It deals with the collection of blood, preparation of antigen and the dilutions of the serum to be used. It is advised that the tests should be kept at 37.5° C. for at least 42 hours before reading.

II. The authors record that, out of 26 pregnant cows or heifers inoculated with *Br. abortus* through the conjunctiva, 25 contracted infection and 22 aborted.

They reported in a previous publication that four out of seven animals had been successfully infected through the intact skin. Later, a further two pregnant animals were infected by this route and one of them aborted.

Two boars and 12 pregnant sows were exposed *via* the conjunctiva to a virulent porcine strain of *Br. abortus* and all but one became infected. *Br. abortus* was recovered by means of guinea pig inoculation from the blood of 12 of the pigs at varying intervals between the 10th and 45th day. The agglutination titres of the blood varied from 1:50 to 1:1,000; in about half of the samples the titre was 1:50.

In brucella infection of swine there appears to be less tendency for abortion to occur than in bovines and a greater tendency for the agglutinins to disappear from the blood and for recovery to take place.

Br. abortus in the milk of cows with a blood titre of less than 1:100, could not be demonstrated by guinea pig inoculation, but the organism was present in the milk of about 86 per cent. of cows which had a blood titre of 1:200 or higher.

Cotton and Buck believe that a blood titre of 1:200 or higher indicates udder infection, that a blood titre of 1:100 or less denotes freedom from infection and that a blood test furnishes more accurate information as to udder infection than the testing of milk from individual quarters for agglutinins.

Some interesting observations were made in immunity experiments with strains of *Br. abortus* which varied in virulence. The inoculation of calves with live vaccine conferred a considerable degree of immunity during the first period of gestation and the authors believe that the protection persists for a number of years.

The immunizing value of two avirulent strains of *Br. abortus* were tested and neither appeared to confer a high degree of protection.—T. M. DOYLE.

- I. JOHNSON, H. W., & SHOLL, L. B. (1931). **Abortion accompanies *Brucella suis* Infection in a Sow.**—*Michigan Agric. Expt. Sta. Quart. Bull.* No. 13, 209-211. [2 refs.]
- II. COTTON, W. E., & BUCK, J. M. (1932). ***Brucella Abortus* in the Blood Stream of Swine.**—*North Amer. Vet.* **13**, No. 2, 35-43. 3 tables.

I. Johnson and Sholl report a case of abortion in a sow, the only one that aborted out of 43 which reacted positively to the agglutination test. The sow was killed ten days after aborting and the porcine strain of *Br. abortus* was isolated from the spleen and from the supramammary and submaxillary lymph glands.

The authors describe in detail the macroscopic and microscopic appearance of the placentas of the aborted foetuses.

II. Cotton and Buck carried out experiments to ascertain whether *Br. abortus* occurs in the blood stream of affected pigs and if so, the length of time it persists there. Two boars and 12 sows, negative to the agglutination test, were infected by instilling a few drops of a heavy suspension of *Br. abortus* into both eyes. Blood was then drawn on from four to ten occasions at short intervals from each pig and 3 c.c. injected intraperitoneally into each of four guinea pigs which were killed for examination two months later.

Thirteen of the 14 animals became infected as the result of the instillation of the *Br. abortus* suspension into the eyes and the organism was recovered, at various periods from the 10th to the 45th day, from the blood of 12 of them.

It was recovered once only from the blood of five animals, from three animals it was recovered twice and from four animals it was recovered three times. The longest period over which the organism was recovered from the blood stream was 22 days, but there was some evidence that it might persist in the blood for as long as 75 days.—T. M. DOYLE.

- I. BEATTIE, C. P. (1932). **Undulant Fever produced by Brucella Abortus.**—*Lancet*. 222. 1002-1005. 3 tables. [15 refs.]
- II. SMITH, F. B. (1932). **Undulant Fever.**—*Ibid.* 1122.
- III. FORBES, A. (1932). **A Case of Abortus Fever in Yorkshire.**—*Brit. Med. J.* June 4th. 1028-1029. 1 chart. [5 refs.]
- IV. TURTON, P. H. J., & PECKHAM, C. F. (1932). **A Case of Undulant Fever in Derbyshire.**—*Ibid.* 1029-1030. 1 chart. [1 ref.]
- V. MESSER, A. I. (1932). **A Note on the Incidence of Br. abortus Infections.**—*Ibid.* 1030.

I. The writer discusses the possible modes of infection in cases of undulant fever due to *Br. abortus* in this country and gives details of nine cases which have been investigated. He states that "as far as the investigation has gone it would seem to show :—

"(1) that the possibility of infection from retailed raw milk is considerable. In Edinburgh 34.9 per cent. of such milk samples have been found to contain *Br. abortus*.

"(2) that the test for the presence of *Br. abortus* agglutinins in the sera of guinea pigs inoculated with milk provides a sufficiently accurate method of estimating the prevalence of *Br. abortus* in milk samples. This method can easily be adopted during the biological examination of milk for tubercle bacilli.

"(3) that of 36 strains of *Br. abortus* isolated from milk in Edinburgh all were of bovine type.

"(4) that a definite proportion of febrile illnesses which resemble enteric fever is undulant fever. In Edinburgh out of 24 such cases four were cases of undulant fever."

II. In a letter to the editor the writer records four cases of undulant fever detected in the Preston area of Lancashire, between September, 1930, and April, 1932.

"All four cases, when reviewed, conformed with *abortus* fever. One case was the child of a farmer in whose herd of cows was infection. In no other case was there indication of the source of infection. In no case was a positive culture obtained."

III. The author expresses the opinion that "if, as the Americans tell us, this fever—*B. abortus* Bang—is to be 'the fever of the future,' it is important that cases should be recorded and the attention of practitioners called to this subject." He then proceeds to discuss a case of a master upholsterer, aged 32, living in a small Yorkshire town in the West Riding. The symptoms are described in some detail. The history indicated an infection "with one of the typhoid group" but blood tested at Sheffield University proved negative to *Bact. typhosum* and

Bact. paratyphosum A, B and C. Later a complete set of agglutination tests was done, all of which were negative except the one against *Br. abortus* which caused definite agglutination in a dilution of 1:25 to 1:250. The accompanying chart indicates that the temperature was not of the typical undulating form. Intramuscular injections of S.U.P.36 commenced at the end of the sixth week produced what is described as quite a dramatic change.

"It is not suggested that this chemotherapeutic agent strikes at any particular micro-organism, but that it has a great influence on pyrexia and creates a general feeling of well-being in the patient is certain." The writer comments "the surprising thing is that the incidence of abortus fever is so low. It may be that the bovine strain is of relatively low pathogenicity for human beings, or that there are other factors of immunity responsible for the low incidence. It is also difficult to understand why children under 5 years of age appear to be almost immune. Is it possible that unrecognized cases in infancy account for the relatively high immunity in adults?"

IV. A case of undulant fever occurring in Derbyshire in a person indigenous to the county is recorded for the first time. The patient was a dairy farmer owning a herd of 20 cows. He did not live on the farm and worked very little on it, the milking being "done by a man." He had assisted a veterinary surgeon in "calving" a cow, but his only contact was to "pull on the rope." He never drank raw milk or cream and only occasionally ate home-made butter. His symptoms are described and the reasons for the diagnosis given. With the agglutination test a positive reaction against *Br. abortus* 1:250 was obtained and later 1:500. No *Br. abortus* developed by appropriate cultural methods.

V. For some time past an emulsion of *Br. abortus* has been included in the routine agglutination test on sera sent to the Northumberland County Laboratory for Widal reactions. Of 186 sera examined, 16 agglutinated *Bact. typhosum* (H), one *Bact. typhosum* (O), 37 *Bact. paratyphosum* B, and 12 *Br. abortus*. Details are shown in a table. The author writes "assuming the validity of the agglutination reaction in diagnosis, the results recorded in this note suggest that *Brucella* infections are relatively common."—LL. E. W. BEVAN.

OLIN, G. (1931). Ueber das Vorkommen abortiver Banginfektionen beim Menschen in Schweden. [The Presence of *Brucella* Infection of Man in Sweden].—*Zschr. Immun.-Forsch.* **71**, 531-540. 4 tables. [8 refs.]

The author has examined 3,003 samples of human sera which were sent to the laboratory for the Wassermann test for agglutinins to *Br. abortus*. The bacterial antigen was prepared from a strain isolated from a case of undulant fever in Sweden. To act as controls, 103 samples from normal humans living in Lapland and 102 samples from new-born children in Stockholm were included. His findings were as follows:—

		Percentage of Positives.				
	No.	1/10	1/20	1/40	1/80	1/160
Wassermann ...	3,003	15.9	14.7	4.1	1.5	0.56
Normal ...	103	—	11.6	3.9	0.97	—
New-born children	102	—	—	—	—	—

Of the 3,003 samples 15 (0.5 per cent.) gave a positive complement-fixation test with *Br. abortus*. Arguing that 0.56 per cent. of the samples (i.e. those agglutinating over 1:80) gave a reaction which he would consider to be a specific one, he concludes that of the six million people living in the land there must be 30,000

cases of latent infection with brucella, whilst actually during the years 1928 to 1930 the morbidity amongst country people was 2.5 per 100,000 and amongst town dwellers 6.1 per 100,000. The curious point is that country people consume raw cow's milk whilst town people have a large portion of their milk supply pasteurized. The author also points out that more men appear to contract the disease than women, whilst it is practically unknown in children under ten years of age. On the other hand, in the various age groups there is in most cases a higher percentage of positive agglutination results amongst females than amongst males.

—R. LOVELL.

RUFFINO, P. (1931). Distribuzione della febbre ondulante e del *Bacillus abortus* in Provincia di Modena. [*The Distribution of Undulant Fever and of *Brucella abortus* in the Province of Modena*].—*Arch. ital. Sci. Med.* col. 12. 543-555. [Summaries in English, French and German : abst. from orig.]

This paper is purely statistical and deals with the distribution of undulant fever and the abortion bacillus in the province of Modena during the period 1928 to 1930. The number of cases shows evidence of increasing.

—A. LESLIE SHEATHER.

I. GAIGER, S. H. (1932). **Haemorrhagic Septicaemia**.—*Vet. Rec.* 12. 217-218.

II. WRIGHT, J. G. (1932). **Septicaemia Haemorrhagica (?) in Cattle**.—*Ibid.* 270-271.

III. TWEED, W. (1932). **Septicaemia Haemorrhagica (?) in Cattle**.—*Ibid.* 271.

I. Gaiger discusses a clinical report by PRATT and GOLD [see this *Bulletin*, 2. 373.] on a disease of cattle believed to have been caused by a bipolar organism and which apparently they considered was haemorrhagic septicaemia. Gaiger describes the symptoms and lesions of haemorrhagic septicaemia (barbone) and asserts that no case of this disease has as yet been proved to have occurred in the British Isles. He points out that there is no evidence that haemorrhagic septicaemia is directly transmissible from an affected animal to a healthy one and that it occurs mainly among animals having access to swampy ground.

II. Wright also discusses the report by PRATT and GOLD, on which case he acted as consultant, and joins issue with Gaiger on the point of direct transmissibility of infection between diseased and healthy animals, while agreeing apparently that the disease was not haemorrhagic septicaemia.

III. Tweed is of the same opinion as Gaiger that there is no justification for claiming that bovine pneumonia [presumably that form claimed to be caused by an organism of the pasteurella group] in Britain and haemorrhagic septicaemia (barbone) as known in other parts of the world are identical infections.

—T. M. DOYLE.

REIMANN, H. A. (1932). **Further Studies on *B. pseudotuberculosis***.—*Amer. J. Hyg.* 16. 206-214. 5 figs. on 2 plates, 1 table. [14 refs.]

The author asserts that the organisms causing plague, tularaemia and pseudotuberculosis are so closely related that they should all be classified as pasteurella. They are all Gram-negative bacteria, exhibit pleomorphism, may invade and be demonstrated in tissue cells, and buboes and areas of necrosis may be produced in animal tissue. Furthermore all of them appear to be soluble in sodium ricinoleate. [The statement as to their non-motility needs modification as *Past. pseudotuberculosis rodentium* is considered to be motile if grown overnight at the lower temperature of 22° C.] One main difference appears to be the inability of the

organism of tularaemia to grow on agar, and its slow growth on other media.

The desirability of abandoning the term "pseudotuberculosis" for all other conditions except that associated with *Past. pseudotuberculosis rodentium* is advocated.—R. LOVELL.

SKIDMORE, L. V. (1932). **The Transmission of Fowl Cholera to Turkeys by the Common House Fly (*Musca Domestica* Linn.), with Brief Notes on the Viability of Fowl Cholera Microorganisms.**—*Cornell Vet.* **22**, 281-285. 2 tables.

The sudden death from fowl cholera of an eight weeks old turkey isolated in a wire cage led the author to investigate the possible means of infection, and it was found that the probable means of transmission had been by eating flies which had become contaminated by the blood of rabbits on which *post-mortem* examinations had been made in another room in the laboratory. The author describes a number of experiments which he made following upon this information, from which he was able to prove that flies allowed to feed on the blood of animals and birds which had died of fowl cholera are capable of conveying this disease to turkeys.

Observations were also made by the same author upon the viability of the fowl cholera organism. A drop of fowl cholera infected blood dried on a glass slide and kept at room temperature was pathogenic eight days later. A similar drop of blood under like conditions was not pathogenic on the 30th day. The author draws conclusions with regard to the disposal of fowl cholera carcasses to prevent the access of flies.—S. H. GAIGER.

I. JIMCNEZ, Marie E. (1931). Sur l'existence d'une substance spécifique hydrocarbonée dans le *Bacillus perfringens*. [**The Presence of a Specific Hydrocarbon in *Clostridium welchii***].—*C. R. Soc. Biol. Paris.* **106**, 140-141. [1 ref.]

II. SORDELLI, A., & FERRARI, J. (1931). Quelques propriétés du serum antimicrobien contre le *Bacillus perfringens*. [**Some Properties of Antibacterial *Cl. welchii* Serum**].—*Ibid.* 141.

I. Extracts of *Cl. welchii* obtained by heating a suspension of the organisms give a heavy precipitate when treated with an antibacterial *Cl. welchii* serum. The forerunner of the precipitate in the extract, that is, the precipitogen, may be obtained in its entirety by treatment with a 1.3 per cent. solution of sodium acetate in alcohol and the sediment so obtained is easily soluble in water, but can be reprecipitated. The solution in water precipitates heavily with anti-*Cl. welchii* serum and contains a hydrocarbon, but it does not reduce Fehling's solution.

II. A rapid method for the diagnosis of *Cl. welchii* infection is formulated.

Antibacterial *Cl. welchii* serum, when added to boiled or alcohol-treated suspensions of *Cl. welchii* organisms, gives rise to a distinct precipitate. The precipitin in the serum may be obtained in a pure form by dilution with distilled water and saturation with carbon dioxide. In the tissues of a guinea pig infected with *Cl. welchii* there are substances which act in the same manner as the bacterial extracts; that is, they contain thermostable precipitogen. If extracts of these tissues are diluted with an equal volume of normal saline solution, heated at 100° C. for 15 minutes and filtered, they give the characteristic reaction with extracted precipitin in dilutions ranging from 1:5 to 1:40.—R. S. ROBERTS.

FITCH, C. P., & BISHOP, Lucille M. (1932). **A Bacteriological Study of the Gravid and Nongravid Bovine Uterus.**—*Cornell Vet.* **22**, 225-238. [23 refs.]

This article is a modified thesis presented by the junior author for the degree of M.Sc. at the University of Minnesota. The report is based upon work planned to furnish data on the bacterial flora of the bovine uterus, the authors having found that the literature furnishes controversial information on this subject. An extensive review of the literature is given.

The material for the investigation was from an abattoir in Minnesota and consisted of entire genital tracts collected at the abattoir and removed to the laboratory for bacteriological study. The first 21 specimens were from the ordinary run of cattle killed. Subsequent specimens were from dairy cattle only. 126 specimens were examined, 81 being from pregnant animals and 45 from non-pregnant. The culture media used were such as to facilitate the growth of aerobes, anaerobes and micro-aerophiles. For aerobes serum agar slants and broth cultures were used and for the anaerobes a liver brain medium. For micro-aerophiles cultures were incubated in an atmosphere containing 10 per cent. carbon dioxide. The cultures were made from the utero-chorionic space, from the crypts of the maternal cotyledons, from the amniotic fluid, and heart blood and stomach contents of the foetus. In the case of the non-gravid uterus, cultures were made from the uterine cavity near the bifurcation and also from near the ovarian end of one of the horns.

Sixteen specimens gave from one to three colonies only and were not taken into account. Six specimens were classified as having a definite flora since organisms were found in approximately all the locations cultured. The organisms grown belonged to the genera *Brucella*, *Escherichia*, *Micrococcus*, *Staphylococcus* and *Corynebacterium*. The authors' experiments show that 94 per cent. of their specimens contained no bacteria and this leads them to the general conclusion that the healthy bovine uterus is, in general, free of bacteria.—S. H. GAIGER.

- I. WEINBERG, M., & RANDIN, A. (1931). Ferment fibrolytique d'origine microbienne. [*Fibrolytic Ferment of Bacteria*].—*C. R. Soc. Biol. Paris*. **107**. 27-28.
- II. LE GUYON, R. (1931). Ultrafiltration de la pyocyanine. [*Ultrafiltration of Pyocyanin*].—*Ibid.* **108**. 1224-1225. [4 refs.]

I. A number of bacteria have been tested to see whether they will digest a connective tissue (tendon of Achilles), either when this is first heated for an hour on each of three consecutive days at 80° C. in media or when the uncooked sterile tendon is added to sterile media. Both aerobes and anaerobes were tested. It was found that all those organisms which hydrolysed gelatine attacked the cooked tendon, but of these only two organisms, viz. *Cl. histolyticum* and *Bact. anthracoides*, i.e., one anaerobe and one aerobe, attacked the raw tendon. None of the non-proteolytic strains attacked either the cooked or raw tendon. It is concluded that the raw tendon is digested by a special enzyme, possessed by certain bacteria, which enzyme the authors call a fibrolytic ferment.

II. Pyocyanin, the bacterial pigment, was prepared from peptone water cultures of the organism. The medium was made alkaline with ammonia and the pigment (blue in colour) extracted by shaking with chloroform. The latter solution was shaken with acidulated water which extracted the pigment (now red) but left the fats. The chloroform extraction was repeated and the chloroform evaporated off in the water bath. The residue was dissolved in distilled water and is said to be a pure solution of pyocyanin.

This solution was submitted to ultrafiltration through specially prepared collodion sacs. The author concludes that this filtrability confirms the crystalloidal nature of the pigment.—W. R. WOOLDRIDGE.

BARRITT, N. W. (1931). **The Liberation of Elementary Nitrogen by Bacteria.**—*Biochem. J.* **25**. 1965-1972. 2 tables. [34 refs.]

Previous work on the liberation of nitrogen gas by bacteria is briefly reviewed and it is shown that the subject is still in a confused state. Original experimental work is described in which a number of synthetic media, containing variable sources of nitrogen, were inoculated with a mixed culture of soil organisms, by shaking the media with a small quantity of soil. From the experimental work described it is deduced that the production of free nitrogen from organic compounds does not occur as the direct result of bacterial action, but only indirectly following upon the interaction between free nitrous acid and an amino-compound, which may be produced simultaneously by bacteria. It appears that the presence of carbohydrate in the medium facilitates this action [possibly by making the medium more acid].

It is shown that nitrous acid may be liberated from nitrites by the action of organic acids or of carbonic acid, but that amino acids are not decomposed by the liberated acid unless the pH of the medium becomes more acid than pH 6.0. The presence of nitrous acid and amino groups together in a metabolism mixture may lead to erroneous Kjeldahl estimation of the total nitrogen, for on the addition of the sulphuric acid there may be a liberation of nitrogen gas and, therefore, loss of nitrogen. There is no liberation of free nitrogen by the decomposition of ammonium nitrite in culture solutions at ordinary temperatures.

—W. R. WOOLDRIDGE.

SCHOEN, M. (1931). Problèmes de spécificité dans les processus de fermentation. [**Specificity Problems in Fermentation Processes**].—*Ann. Inst. Pasteur.* **47**. 690-742. [Numerous refs.]

This paper is a review of our knowledge of the processes of fermentation, giving particular attention to questions of specificity. The author begins by emphasizing the variability exhibited by the same organism when grown under different conditions. He shows how many factors influence the chemical activities of organisms. The various types of fermentation of sugar are discussed.

It is suggested that the functional specificity of an organism depends, in the first place, upon the constitution of its enzyme systems and that modification of this specificity results from modification of this enzyme system. Under natural conditions this modification is generally known as the processes of evolution. Under cultural conditions something in the medium might modify the activity of a certain enzyme and so upset the general balance of that organism's system, so that the resulting chemical products may be quite different from those usually expected. Specificity does not depend upon the particular enzymes present in a cell but rather upon the ability of the cell to bring these enzymes into action in a certain order. This depends to a large extent upon such problems as adsorption, fixation and inhibition, elution, etc. of substrates, which phenomena really depend upon the actual cellular structure of the organism. The author also discusses the problems of oxidation and of fermentation or anaerobic metabolism and concludes that the two series of phenomena are intimately related.

—W. R. WOOLDRIDGE.

ØRSKOV, J. (1932). Der Bakterielle Infektionsmechanismus. [**The Mechanism of Bacterial Infection**].—*Transactions of the Fifth Scandinavian Pathological Congress*. Held in Lund, Sweden. July 3rd-6th. 1932. Suppl. 11. *Acta. Path. et Microbiol. Scand.* pp. 10-58.

The author in this article presents a concise account of his researches extending

over the last seven or eight years on the mechanism of bacterial infection. Work previously published is included in this article and references are given.

The research really concerns the mechanism of bacterial infection in general and the author describes the average mechanism in the present tense (dogmatic account) and then refers briefly to the individual results shown in detail in the tables: the latter are of distinctly secondary interest in this article.

Mice were used in the majority of the experiments; guinea pigs and rats were used in certain special instances.

In his introduction the author refers to the early work of WYSSOKOWITSCH (1886) and of Max MÜLLER (1912) many of whose conclusions he supports. The experiments described were performed in the State Serum Institute, Copenhagen

THE COURSE OF INFECTION AFTER INTRAVENOUS AND PERORAL ADMINISTRATION.

A. INTRAVENOUS INFECTION.—The animals and dosages used varied in the different experiments. The author makes the following generalization.

At one hour after infection bacteria are still to be found in the blood and also in the liver and spleen. After three hours the blood has become sterile whilst bacteria are very numerous in the liver and spleen. After 24 to 28 hours a condition of bacteraemia occurs and the organisms return to the blood whilst still remaining in the liver and spleen. This condition remains until the death of the animal. It appears that the blood has no primary bactericidal action, as with *Bact. enteritidis* (Breslau strain) in mice, even a dose of 10 bacteria suffices to kill 5 out of 10 animals: fixed phagocytes on the other hand are important in overcoming infection. At a certain period after infection bacteria begin to be demonstrable in the intestine, first appearing in the duodenum, and the author considers that this is an overflow infection from the liver *via* the bile duct. The liver must be considerably injured before this can take place (before the bacteria can gain access to the bile ducts). To support this opinion the liver of a certain number of animals was artificially injured by puncture with a needle before and after infection and in these cases bacteria appeared in the intestine after a shorter interval.

With *Corynebacterium pseudotuberculosis* and *Bact. enteritidis* Gärtner (Ratin strain) similar results were obtained.

B. PERORAL INFECTION.—The progress of bacteria in the body as indicated by cultural and other tests was found to be as follows:—first the lymph follicles of the intestines are invaded, then the mesenteric lymph glands along with the submaxillary lymph glands and then the regional lymph glands, e.g., the axillary and inguinal etc. The next step is a bacteraemia which in the opinion of the author results from passage of the bacteria into the systemic venous circulation *via* the thoracic duct; the bacteria thus reach all parts of the body.

Only a small percentage of bacteria introduced into the intestine succeed in gaining access to the body *via* the lymph follicles: the majority either die or are removed mechanically so that 24 hours after dosing, bacteria are scarce in the intestine and, after 48 hours, are very scarce. The size of the infective dose is important with reference to the course of resultant infection. Reinfection of the intestine occurs at a later date from the liver. In young animals the whole process of infection is more rapid than in adults.

Attenuated bacteria were given in some experiments; the animals recovered, and it was found that isolated foci of infection remained in some cases in various organs for months, particularly in the mesenteric glands, spleen and liver; excretion of virulent bacilli from the liver was chronic in some instances (carrier state).

C. pseudotuberculosis is capable of causing a generalized infection in mice without producing marked symptoms and the animals do not die: the bacteria remain alive for a long time however in the mesenteric glands.

When tubercle bacilli were used on guinea pigs a constant early result was infection of the bronchial lymph glands, though it was not quite clear whether or not this was due to aspiration after dosing. Tubercle bacilli were not isolated from the regional lymph system until 24 days or more after infection. After this interval the infection became widespread in the body, but the blood had not yet been invaded.

When attenuated *Bact. enteritidis* (Breslau strain) was given *per os* no general illness followed, but the bacilli persisted for a long time in the mesenteric lymph glands. In such cases infection did not reach the liver and spleen. When greatly attenuated bacteria were used, infection did not pass beyond the intestinal lymph follicles.

Two experiments were performed with this organism in order to ascertain the influence of ill health on the course of the bacterial infection. It was found that rats suffering from avitaminosis A were more susceptible to the bacteria and that the course of infection was more severe in animals subjected to X-radiation.

THE MECHANISM OF INFECTION IN ACTIVELY IMMUNIZED ANIMALS.

A number of experiments were performed and it was clear that in animals previously vaccinated the course of infection is much shorter than in non-vaccinated animals: absolute immunity is never conferred by vaccination; it is merely relative. Usually the course of infection is the same up to about ten days after infection in both vaccinated and non-vaccinated animals, but after about two weeks the vaccinated animals rapidly overcome the infection and the illness comes to an end, whilst it progresses in the controls.

IMMUNITY.

BCG vaccination (given subcutaneously) was found to confer an appreciable relative immunity against virulent human tubercle bacilli in guinea pigs when given either *per os* or subcutaneously.

The author raises the matter of K. A. Jensen's paradoxical immunity phenomenon and discusses it briefly. This is to the effect that, when vaccinated animals are infected, the bacteria penetrate into the body more rapidly than they do in controls, though they are overcome by the defences of the host after the usual time.

Two other short papers by other authors followed that of ørskov and the discussion on all three is reported on pp. 63-74 of the transactions.—J. E.

BENNETT, S. C. J. (1932). **Epizootic Lymphangitis: Mycelial Forms of the Parasite in a Natural Case.**—*J. Comp. Path. & Therap.* **45**, 158-160. 3 figs. [1 ref.]

This is a short paper whose purpose is to place on record the occurrence of hyphae of *Cryptococcus farciminosus* in a naturally occurring case of epizootic lymphangitis. The subject was an aged horse in the Blue Nile Province of the Sudan. The lesions were very extensive, covering practically the whole of the horse's skin, extending into the nostrils and affecting the submaxillary lymphatic glands. In the lungs were a number of pea-like scattered nodules closely simulating glanders. Only the head and smears from the lung nodules were subjected to detailed examination. In the smears from the lung nodules were seen characteristic hyphae of the *Cryptococcus* such as are formed in artificial culture.

—S. H. GAIGER.

NAESLUND, C. (1931). Experimentelle Studien über die Aetiologie und Pathogenese der Actinomykose. [**Experimental Investigations into the Cause and Pathogenesis of Actinomycosis**]. Suppl. 6. *Acta path. et microbiol. Scand.* pp. 156. 33 figs. [520 refs.]

This treatise is a monographic study on actinomycosis from the Hygienic-Bacteriological Institute in Upsala. It contains the following chapters:—Survey of literature; personal investigations, (1) actinomycetes of aerobic character; (a) non-pathogenic actinomycetes from cases of actinomycosis, (b) pathogenic actinomycetes from cases of actinomycosis, (c) experiments with *Actinomyces* strains, cultivated from soil, (d) experiments with *Actinomyces* strains, cultivated from the stomach cavity, larynx and intestinal tract of healthy persons; (2) actinomycetes of anaerobic character (Wolff-Israel type); (3) inoculation experiments with material from the stomach cavity of healthy persons; (4) the rôle of mixed infections in the production of actinomycosis; (5) the aetiological rôle of vegetable particles and other foreign bodies in actinomycosis; (6) the importance of traumatism in the development of actinomycotic lesions; (7) investigations into the relation of the pathogenic to the saprophytic actinomycetes together with the mutual relationship of the former; (8) granular, radiate and club forms; (9) different forms of disease in actinomycosis; (10) the pathogenesis of the different forms of actinomycosis; (11) diagnosis of actinomycosis together with a proposal for the classification of the types of disease.

As regards details of the work it may be noted that the author is of the opinion that the so-called Boström type of *Actinomyces* should be excluded as an aetiological factor of actinomycosis, and that for the present, at least, it should be placed in the group of the saprophytic actinomycetes.

The author agrees with others that there are various pathogenic actinomycetes, most of which are aerobic.

Among the many hundred strains of actinomycetes which have been cultivated from soil and vegetable fragments, two strains must be considered to be pathogenic.

In the stomach cavity of healthy persons an actinomycete identical with the anaerobic actinomycetes of the so-called "Wolff-Israel" type may be found which produces actinomycosis in human beings and in cattle. This type is found on the surface of healthy as well as of carious teeth.

Mixed infections with different organisms seem to have no influence upon the production of actinomycosis. A secondary infection with pyogenic bacteria may lead to a greater extension of the actinomycotic lesions and a stronger suppuration than would otherwise occur.

Perforation of the mucosa with vegetable fragments or other foreign bodies is no doubt common, but it is by no means the only method of infection. The rôle which foreign bodies play in this connection is certainly only occasional, as is the case in certain other infections, for instance, in infections with pyogenic cocci.

Traumatic lesions are not of special importance as aetiological factors. The majority of actinomycosis cases are produced by anaerobic actinomycetes (Wolff-Israel type) and only a smaller number by the aerobic type.

—H. LORENZEN (DENMARK).

DISEASES CAUSED BY PROTOZOAN PARASITES.

VERGE, J. (1931). Les coccidioses aviaires. [**Avian Coccidiosis**].—*Rec. Méd. vét.* 107. 65-77.

A review article, embracing the clinical and pathological aspects of coccidiosis in domestic birds and in some game birds. The names of the authorities from which information has been obtained are quoted, but no references are given.

—R. S. ROBERTS.

RUSSELL, P. F. (1932). **Avian Malaria Studies. IV. Haemoproteus and Plasmodium in Birds of Luzon Philippine Islands. V. *Plasmodium capistrani* sp. nov., an Avian Malaria Parasite in the Philippines.**—*Philippine J. Sci.* **48**. 263-268 and 269-287. 2 plates, 6 tables. [18 refs.]

The author points out the confusion which exists in the nomenclature of the avian malaria parasites and mentions six which he considers have a claim to a specific name, viz. *Plasmodium relictum*, *P. cathemarium*, *P. rouxi*, *P. circumflexum*, *P. elongatum* and *P. capistrani*. The last named is a new species of which he gives a description. He obtained it when examining the blood of about 600 wild birds for blood parasites. A number of these birds showed infection with either haemoproteus or plasmodium or both and *P. capistrani* was found in the island painted quail and established in canaries by blood inoculation. The author has been able to transmit this parasite by direct inoculation of blood or sporozoites and by culex mosquitoes.—NORMAN HOLE.

NUZUM, F. R., ELLIOT, A. H., & PRIEST, Blanche V. (1931). **The Flagellate, *Trichomonas hominis* in the Rabbit—its Pathogenicity. Report of an Instance of Infestation in Man, with Necropsy Findings.**—*California & Western Med.* **35**. 19-22. [26 reis.]

An account of an experiment in which it was considered that rabbits became infected when fed on human faeces infected with *Tr. hominis*. The organisms were later demonstrated in the caeca but there was no evidence of tissue penetration. In the human case the evidence of pathogenicity was not conclusive.

—U. F. RICHARDSON.

DISEASES CAUSED BY FILTRABLE VIRUSES.

GALEA, M. (1932). Sur l'immunisation active du cobaye contre la fièvre aphteuse à l'aide d'un virus aphteux non atténué. [**Active Immunization of the Guinea Pig against Foot and Mouth Disease by Means of a Non-attenuated Virus**].—*C.R. Soc. Biol. Paris.* **109**. 1262-1265.

GALEA, M. (1932). Sur l'immunisation active du cobaye contre la fièvre aphteuse à l'aide d'un virus aphteux inactivé par le chloroforme. Voie d'introduction de l'antigène. [**Active Immunization of the Guinea Pig against Foot and Mouth Disease by Means of a Virus inactivated by Chloroform. Route of Introduction of the Antigen**].—*Ibid.* **110**. 270-272. [1 ref.]

The addition of vaseline to an inoculum of active virus, introduced subcutaneously, retards generalization; the production of an inflammatory focus at the site of inoculation, set up by adding "farine d'infusoires" to the vaseline, may result in the complete arrest of generalization. Guinea pigs inoculated in this manner, which showed no lesions of foot and mouth disease, were found, however, to possess an active immunity when tested by subcutaneous inoculation of the same strain of virus some 20 days later. Intradermal testing frequently broke this immunity, but it seems that some immunity can be obtained in this manner without the production of typical vesicular lesions.

Keeping a fine emulsion of infected epithelium in the dark at room temperature, in a 1 per cent. chloroform solution, killed the virus in ten days; the antigenic properties, however, were not destroyed. The subcutaneous or intradermal inoculation of this dead chloroform vaccine into the abdominal wall protected guinea pigs against a test inoculation made 20 days later. The intradermal route gave the better results.—NORMAN HOLE.

MANNINGER, R. (1932). Ueber die Beziehungen der Newcastle-Krankheit zur Geflügelpest. Zugleich ein Beitrag zur Frage der Pluralität der filtrierbaren Krankheitserreger. [**The Relations between Newcastle Disease and Fowl Plague: Do the Causal Agents represent Different Virus Types?**]—*Arch. wiss. prakt. Tierhkl.* **65**. 256-265. [3 refs.]

The virus of Newcastle disease, i.e., the pseudo fowl plague first studied by DOYLE, 1927, set up, when it was received in Budapest in 1930 from Weybridge, fever in three days and death in eight days in an inoculated fowl. Fresh liver pulp from this fowl produced, upon inoculation into a second fowl, mild disease, followed by recovery. A fresh supply of virus in liver and spleen emulsion was then obtained from Weybridge and inoculated into four fowls. All showed fever on the third or fourth day. Two recovered, after showing severe symptoms; the other two were bled out at the onset of fever, and their blood when then inoculated, in 0.1 to 1.0 c.c. doses, intramuscularly into fowls caused fever in 24 to 48 hours and death in 4 to 5 days. Blood withdrawn in this way at the onset of fever was passaged in fowls, with the result that the virus steadily gained in activity until the tenth passage and thereafter remained rather constant both in activity and concentration in the blood, so that a dose as low as 10^{-6} g. caused death within 48 hours. Likewise, the virulence of the organs increased, and a fatal disease which in every way resembled fowl plague could be induced by inoculation of liver pulp in 50 per cent. glycerol stored for several weeks in an ice-box. Parallel experiments with an Austrian strain of fowl plague showed that no differences could be seen between the two diseases in regard to the inconstant results obtained in producing disease among healthy fowls by contact with infected fowls or by feeding with morbid material.

Comparison of the two viruses by cross-immunity tests is difficult, because recoveries from fowl plague are extremely rare. In the case of Newcastle disease, the degree of active immunity acquired by fowls after recovery from inoculation with the virus before it was artificially increased in activity was found to be a very low one. Thus, two of the originally inoculated fowls which had survived died within three days after inoculation with 10^{-4} g. of blood containing the passaged virus. Hence, to perform cross-immunity tests satisfactorily, it was necessary to obtain a supply of fowls hyperimmunized against each virus. One fowl which had recovered from the Newcastle infection and one, out of 212, which had recovered from fowl plague were inoculated repeatedly with slowly increasing doses of the homologous viruses until they could eventually withstand 10^4 M.L.D. and were then bled several times for serum. With the two antisera, 47 fowls were subjected to serum-simultaneous immunization, and thereafter hyperimmunized. The mortality caused by the injections was very large, and there survived only nine, namely, four hyperimmune against the Newcastle virus and five against the fowl plague virus. These two lots were then inoculated crosswise with the viruses in large dose (10^4 M.L.D.), with the result that all fowls hyperimmune against fowl plague were found to be fully protected against Newcastle disease, and *vice versa*. Manninger states that the conclusions arrived at by DOYLE (1927), and PICARD (1930) in Java, that the viruses were different

as the result of cross-immunity tests would be explained by his findings regarding the susceptibility of fowls to reinoculation with the fowl plague virus; thus, fowls which had recovered after serum-simultaneous inoculation could rarely withstand more than 50 M.L.D. of the virus at a subsequent inoculation. His contention therefore is that the virus of Newcastle disease does not differ in type from that of the well-known fowl plague, but is the same virus which has been modified for some reason to an unusually low degree of activity, to become responsible for outbreaks of fowl plague that run a subacute course.—J. T. EDWARDS.

DAUBNEY, R., & HUDSON, J. R. (1931). **Nairobi Sheep Disease.**—*Ann. Rep. Dept. Agric. Kenya, 1930.* pp. 127-131. 1 table. [2 refs.]

The disease is characterized by a febrile attack from five to six days after the exposure of susceptible sheep. The attack lasts from six to nine days. With the fall in temperature, other symptoms may develop followed by death, or a second febrile reaction after a quiescent period of from three to seven days. Some deaths occur in this second reaction but the animals usually recover.

The symptoms are a mucopurulent nasal discharge, rapid respiration, green watery diarrhoea and swelling and congestion of the vulva. The disease is characterized by congestion and inflammation of the alimentary and genital tracts, enlargement of the spleen and ecchymoses of the kidneys and heart. The filtrability of the virus was confirmed and it was ascertained that it could be preserved by cold or by drying and that it survives in O. C. G. [oxalate-carbol-glycerol] at room temperature for 93 days. Goats and sheep are susceptible but not cattle and the immunity in sheep lasts at least one year. The virus is transmitted by *Rhipicephalus appendiculatus* and will pass through the eggs.

That the disease is not heartwater is shown by the different tick transmitter, the shorter incubation period, the absence of rickettsia, the non-susceptibility of cattle and by cross-immunity tests.

The paper confirms and extends the observations of R. E. MONTGOMERY.
—U. F. RICHARDSON.

GLUSMAN, M. P., GORFUNKEL, D. M., & SSOLOWIEWA, J. W. (1931). Zur Frage der elektrischen Ladung des Lyssa-Virus. [**On the Electric Charge of Lyssa Virus**].—*Zlb. Bakt. I. (Orig.)*. **121**, 476-481. 1 text fig. [19 refs.]

The authors studied the sign of the charge of rabies virus using a described modification of Todd's cataphoresis apparatus [compare RHOADS & LONG, OLITSKY, NICOLAU & KOPCOWSKA, and others abstracted in this *Bulletin*].

They used a suitably buffered brain emulsion of rabbits killed in the agonal stage of an infection with a laboratory strain of the virus and observed travel towards the anode at pH 6.0 to 9.3, the movement being slowed down at pH 8.0 to 8.6 so that after two hours the cathode chamber still contained virus (as tested on rabbits).

Since movement of the emulsion as a whole was observed a purification of the virus from adherent material could not be demonstrated.—H. H. GREEN.

GOODPASTURE, E. W., WOODRUFF, Alice M., & BUDDINGH, G. J. (1932). **Vaccinal Infection of the Chorio-Allantoic Membrane of the Chick Embryo.**—*Amer. J. Path.* **8**, 271-281. 14 text figs. [12 refs.]

These authors have infected the chorio-allantoic membrane of embryonic chicks and have made a histological survey of the resultant infection. Their evidence points to the Guarnieri bodies being composed in part of Paschen corpuscles and they draw analogies between the relationship of Lipschütz granules

and the inclusion-bodies of molluscum contagiosum and the Borrell bodies and Bollenger bodies of fowl pox. On a cytological basis they suggest that in tissue culture molluscum contagiosum should require an ectodermal medium, fowl pox an ectodermal or entodermal medium, whilst vaccinia should multiply on a medium composed of any of the three germinal layers.—NORMAN HOLE.

- I. THOMSEN, O., & ENGELBRETH-HOLM, J. (1932). De la provocation expérimentale d'états leucosiforms chez les poules. [**Experimental Production of Forms of Leucosis in Fowls**].—*C. R. Soc. Biol. Paris*. 109. 1218-1215. [1 ref.]
- II. ENGELBRETH-HOLM, J. (1932). De la relation entre les diverses formes de la leucose des poules. [**The Relation between the Different Forms of Fowl Leucosis**].—*Ibid.* 1216-1218. [5 refs.]
- III. ENGELBRETH-HOLM, J., & MEYER, A. R. (1932). Transmission de la leucose des poules à des poussins. [**Transmission of Fowl Leucosis to Chicks**].—*Ibid.* 1219-1221. [1 ref.]
- IV. ENGELBRETH-HOLM, J. (1932). De l'érythroleucose (erythro) chez la poule. [**Erythroleucosis in the Fowl**].—*Ibid.* 1222-1224.

I. On the assumption that leucosis of fowls is a tumour of the blood forming tissues, Thomsen and Engelbreth-Holm inoculated small amounts of coal tar into the bone-marrow of 62 fowls every five days. After intervals varying from one to four and a half months, 11 of the birds developed a condition indistinguishable from spontaneous leucosis. The liver and spleen were greatly hypertrophied; the liver and bone-marrow had a marbled appearance.

The microscopical appearance was that of a uniform myeloid hyperplasia; stratified extravascular masses of typical granular myelocytes were seen, but no lymphatic hyperplasia. A low haemoglobin content and increase in the number of leucocytes was noted in some cases and there was also a change in the ratio of myeloid to lymphoid cells. Immature myeloid cells were seen in some cases and even mitotic figures in the circulating blood were observed. The authors consider that the percentage of cases was too high for them to be spontaneous cases of leucosis.

Attempts to transmit the condition induced have so far been unsuccessful.

II. Engelbreth-Holm has confirmed FURTH's observations on leucosis of fowls, viz. that lymphatic leucosis (the "aleukaemic" form) is not caused by the same agent as that concerned in myeloid leucosis and erythroleucosis. He succeeded in transmitting leucosis to 170 birds out of 363 inoculated with a very potent strain. Of these 170 cases, 164 were cases of erythroleucosis and 6 were mixed forms (myeloid-erythroleucosis). No cases of lymphatic leucosis occurred in these birds.

Attempts to infect 57 birds with material from four spontaneous cases of lymphatic leucosis were unsuccessful.

III. The authors state that spontaneous leucosis has never been described in birds less than two months old. By inoculating intravenously 0.3 c.c. of citrated blood from an adult bird affected with leucosis, they have succeeded in transmitting erythroleucosis to newly hatched chicks and have passed the condition through eleven series of chicks. Positive results were obtained in 100 per cent. of the chicks inoculated. The signs and lesions of the disease are described. The authors observed a strange phenomenon, viz. that, whereas the strain of leucosis used was highly infective for adult birds and by passage became also highly infective for chicks, it gradually declined in infectivity for adult fowls.

IV. Engelbreth-Holm discusses the question as to whether erythroleucosis

should be regarded as an infectious disease or as a tumour. He holds the latter point of view and gives various reasons for doing so. He has observed that the nuclei of the erythroblastic cells, forming the large collections seen in the liver, spleen, kidney, marrow and blood in experimental leucosis, are larger than the nuclei of normal erythroblasts found in the marrow. The measurements are $4.87\ \mu$ as compared with $4.49\ \mu$ and are made from observations on 1,200 cells.

The tumour-like masses in the organs, the absence of febrile and inflammatory signs, its species specificity and the fact that it can be produced by inoculation of tar, are additional reasons in favour of erythroleucosis being regarded as a tumour.—C. MCG.

NIGG, Clara, & LANDSTEINER, K. (1932). **Studies on the Cultivation of the Typhus Fever Rickettsia in the Presence of Live Tissue.**—*J. Exp. Med.* **55**, 563-576. 1 plate, 4 charts. [22 refs.]

Cultivation of the rickettsia of either Mexican or European typhus fever *in vitro* appears to be quite simple, provided that suitable tissue media are used. The authors have subcultured the organisms, without diminution of numbers or virulence, on tunica or peritoneum used in coagulated plasma medium or serum Tyrode medium.

They point out that the fact of viruses requiring living tissue for *in vitro* cultivation has been used as an argument against their being living organisms. Morphologically rickettsiae should be regarded as living organisms; it appears, however, that living tissue is essential for their successful cultivation.

—NORMAN HOLE.

DISEASES CAUSED BY METAZOAN PARASITES.

PETER, B. (1931). Die staatlichen Versuche zur Bekämpfung der Dasselfliege im Jahre 1931. [**Experiments on the Control of Warble Flies in 1931**].—*Berl. tierärztl. Wschr.* **47**, 665-667.

—. (1931). Resistenz der Dasselfliegenlarven gegen Delicia IV und gegen Larfug. [**Resistance of Warble Larvae to Delicia IV and Carbolic**].—*Ibid.* 809-811. 2 tables. [4 refs.]

The first article discusses the general methods of warble fly destruction by spraying, hand dressing of individual swellings and surgical removal. The author thinks that spraying can never be effective and quotes the failure of sulphur dioxide gas to kill the larvae on the host. He admits that spraying has given some encouraging results in Denmark, but points out that local opinion has not been satisfied with these results. The preparation "delicia" has given some good results when used as a spray, but it has not proved possible to standardize it.

The second article deals with the experiments conducted to test the larvacidal properties of "delicia IV" and carbolic ointment. The larval swellings were treated and the animals killed two or three days later and the percentage of dead larvae ascertained. The efficiency of "delicia IV" varied from 24 to 97 per cent. whilst carbolic ointment, if rubbed in for one minute, caused the death of 97 to 100 per cent. of the larvae and if rubbed in for half a minute killed 73 to 94 per cent.—U. F. RICHARDSON.

I. SHAW, G. K. (1931). **Sarcoptic Mange in Camels.**—*Vet. Rec.* **11**, 1078.

II. BOYER, J. (1931). Nuevos tratamientos de la sarna en los animales domesticos. [**New Treatments for Mange in Domestic Animals**].—*Rev.*

Zootéc. 18. 316-319.

I. The author compares the results obtained in the treatment of sarcoptic mange in camels with calcium sulphide [presumably polysulphide], taramira oil and crude mineral oil. The author considers that the latter was far superior and describes its application.

II. A review of the treatment of equine mange evolved in European countries during the Great War. Names are quoted, but no references are given.

—R. S. ROBERTS.

I. OLDHAM, J. N. (1931). *The Helminth Parasites of Common Rats*.—*J. Helminthol.* 9. 49-90. [130 refs.]

II. —. (1931). Imperial Bureau of Agricultural Parasitology. Notes and Memoranda No. 2. Hand-list of Helminth Parasites of the Rabbit.—*Ibid.* 105-116. [78 refs.]

I. This paper catalogues the helminth parasites of the black rat, *Mus rattus*, the Alexandrine rat, *Mus rattus alexandrinus*, the brown rat, *Mus norvegicus*, and rats referred to by other names, their specific identity for various reasons being doubtful. The total number of species of parasitic worms reported in the paper as occurring in common rats is 109 and comprises 27 trematodes, 41 cestodes, 40 nematodes and one acanthocephalid. The species are arranged systematically and in each instance mention is made of the location in the host and the locality from which reports have been made of the parasites' occurrence, together with references to the literature and occasional notes on the synonymy and other aspects of the nomenclature.

II. The names of the parasitic worms recorded from the common rabbit, *Oryctolagus cuniculus* (= *Lepus cuniculus*) are here grouped together under the four classes Trematoda, Cestoda, Nematoda and Acanthocephala and arranged with their principle synonyms in alphabetical order. The name of the author and date of the publication appear in most instances, but no other information is given.—E. L. TAYLOR.

ALDRIDGE, F. C. (1931). *An Outbreak of Trichinosis in Pennsylvania*.—*Amer. J. Med. Sci.* 181. 312-323. 6 figs. on 3 plates, 5 tables. [5 refs.]

The author gives a concise review of the literature on American trichinosis and an account of his own observations on an outbreak involving 29 human cases in a small community.

Two of the 29 cases died, 5 were acutely ill, 17 mildly ill and 5 showed practically no symptoms. Larvae were found in muscle taken from three of the five cases in which this diagnostic test was applied and in the laked blood samples from one of the five which were so examined. Eosinophilia was observed in all but the two fatal cases and is thought by the author to be of great importance in diagnosis; particular note is also made of facial oedema, muscular pains, headache and fever as the most striking symptoms.

The source of infection for all but two of the cases was traced to a certain farm and trichinae were demonstrated in numerous pieces of pork from this source. A report was received that 15 pigs had died of pneumonia during the preceding three or four months, but the author thinks it probable that trichinosis was the real cause of death. [Trichinosis is rarely fatal in the pig and the presumptive evidence in this particular instance is slender].—E. L. TAYLOR.

BLISSETT, A. H., & LITTLE, W. L. (1930). *The Need for Further Knowledge concerning Parasitic Diseases of Pigs*. [From the Proceedings of the

Association of Economic Biologists, London. Meeting of October 25, 1929].—*Ann. Appl. Biol.* **17**. 171-174.

An obscure disease among the pigs at the National Institute for Research in Dairying (Reading) which resulted in a few deaths, is thought to have been due to internal parasites. The first outbreak which occurred was attributed to coccidiosis in conjunction with an infestation of the stomach worm *Hyoststrongylus rubidus*, and a later outbreak to be due to infestation with *Oesophagostomum dentatum*. In an endeavour to trace the source of infection an examination was made at the second outbreak, by a sugar floatation method, of faeces from all the pigs and a short account of the findings is here given :—(1) the faeces of sows running in the woods and of a boar [in the woods ?] showed a large number of eggs ; (2) sows in farrowing pens in outlying buildings and ten newly weaned pigs were found to carry a heavy infestation ; (3) two groups which had been in the piggery for ten weeks proved to be uninfected ; (4) of two groups which had been in the piggery for seven weeks one group proved to be infected and the other not ; (5) four pens including those in which deaths had occurred all proved to carry infection. In subsequent examinations the infestation among the pigs was noticed to diminish and (6) the suckling pigs which were examined were found to pass no eggs until the approach of weaning time. It is concluded that the infestation disappears spontaneously when the animals are kept in clean surroundings. More knowledge is required of the conditions which favour the development of the infective stage of the worms.

In the discussion which followed GOODEY gave a short account of the larval development of *Ascaris lumbricoides*, *Hyoststrongylus rubidus*, *Oesophagostomum dentatum* and *Metastrongylus apri*.—E. L. TAYLOR.

BUCKLEY, J. J. C. (1931). **An Observation on Human Resistance to Infection with *Ascaris* from the Pig.**—*J. Helminthol.* **9**. 45-46: [3 refs.]

There is considerable weight of evidence to suggest that the ascaris of man and the ascaris of the pig belong to distinct physiological strains. The author has made further attempts at cross infection, using the migrating larvae collected by the Baermann technique from the lungs of a young pig. He attempted to produce infection in himself by swallowing 20 larvae and a larger number were given to a green monkey and also to two control pigs. Up to three months later no evidence of further development of the worms had been obtained in the two abnormal hosts, but the pigs were found to be harbouring large numbers of the mature worm.—E. L. TAYLOR.

CARNE, H. R., & ROSS, I. Clunies. (1932). **The Association of the Bacillus of Preisz-Nocard with Lesions caused by *Oesophagostomum columbianum* in Sheep.**—*J. Comp. Path. & Therap.* **45**. 150-157. 1 table.

In this article, the authors give details of an experiment which they conducted in order to determine the validity of the claims of certain European workers that ingestion is the common method of infection with the Preisz-Nocard bacillus and that intestinal parasites play a very important rôle in facilitating such infection.

In their experiment nine unshorn lambs, four months old, were used. Five of them were drenched with cultures of the Preisz-Nocard bacillus and larvae of *Oesophagostomum columbianum* and of the remaining four, which served as controls, two received cultures only and the other two only larvae. The sheep were killed at intervals from 37 to 51 days after the commencement of the experiment.

The *post-mortem* examinations revealed that the administered *Oesophagostomum* larvae had produced marked intestinal lesions in all the sheep and that other

intestinal parasites were present, thus affording very favourable conditions for the entry of organisms. In spite of these lesions, there was only one sheep with a mesenteric gland infected with the Preisz-Nocard bacillus though infection of the submaxillary glands occurred in three animals. The authors attribute the submaxillary gland lesions to infection *per os* during the cutting of teeth.

Bacteriological examination of the *Oesophagostomum* nodules in the intestine and of the lesions caused by wandering larvae in twelve abdominal lymph glands and three livers failed to show the presence of the Preisz-Nocard bacillus.

From the results the authors conclude that injuries of the intestinal mucosa caused by helminth parasites, more particularly by *O. columbianum* are not a common portal of entry of the Preisz-Nocard bacillus under natural conditions. This view is in keeping with the observations of meat inspectors in Australia who have noted the rarity of primary lesions of caseous lymphadenitis in the abdominal lymphatic glands of sheep.—GWILYM O. DAVIES.

I. MORGAN, D. O. (1931). **On the occurrence of Gapeworms in Nestling Starlings and adult Fowls.**—*J. Helminthol.* **9.** 117-120. [5 refs.]

II. MORGAN, D. O. (1931). **On the occurrence of *Hepaticola hepatica* as a natural infection of the Wild Rabbit in England.**—*Ibid.* 39-40. [7 refs.]

I. Of four young starlings taken from a nest one was kept alive in captivity for a week and one for three weeks. At *post-mortem* examination the first was found to carry three pairs of *Syngamus trachea*, several young *Hymenolepis* sp., three *Capillaria ovopunctata* and two young ascarid nematodes, probably *Porrocaecum ensicaudatum*. The second bird was found to carry one pair of *Syngamus trachea* a large number of *Hymenolepis* sp., four *C. ovopunctata* and four mature *P. ensicaudatum*. It is concluded that the infection with *Hymenolepis* sp. must have been carried to the nest in the intermediate hosts and that earthworms brought to the nest must have carried the other parasites mechanically.

An account is also given of the occurrence of 12 pairs of *Syngamus trachea* in a fowl over one year old; the bird was, however, in a weakly condition.

II. NISHIGORI (1925) and SAITO (1925) were unable experimentally to infect rabbits with *Hepaticola hepatica*; there are, however, several more or less reliable records of the natural occurrence of this worm in hares and rabbits. The carcass of a rabbit brought to the author showed a congested condition of the liver and whitish patches, suggesting coccidiosis, which proved on examination to contain masses of eggs of *H. hepatica* of an average size of 0.054 mm. by 0.032 mm. Fragments of female worms were also found, but no males.—E. L. TAYLOR.

MCKINLEY, E. B. (1931). **The Role of Bacteria in Acute Filarial Lymphangitis.**—*Porto Rico J. Publ. Health & Trop. Med.* **6.** 419-427. [16 refs.]

It is generally supposed that the acute lymphangitis of filariasis is caused by secondary bacterial invasion. The author's observations on 38 cases in Porto Rico (where the incidence of filariasis is very high) suggest, however, that acute lymphangitis usually results directly from the filarial infection. Blood cultures taken from the 38 cases (diagnosed as uncomplicated filarial lymphangitis) were uniformly negative, as also were the attempts in 27 cases to culture bacteria from fluid which had been injected subcutaneously into inflamed areas. Cultures prepared from skin removed from inflamed areas in eleven cases yielded in one instance a green-producing streptococcus, in another a haemolytic staphylococcus and in a third a Gram-positive bacillus, the other attempts giving negative results. Cultures made from nine cases diagnosed as septic lymphangitis yielded *Streptococcus haemolyticus* in seven.

There are apparently three types of acute lymphangitis :—(1) lymphangitis of bacterial origin ; (2) lymphangitis of filarial origin and (3) filarial lymphangitis with secondary bacterial infection.—E. L. TAYLOR.

STEULLET, R. (1931). Un cas de parasitisme de l'urèthre par une sangsue *Limnatis nilotica* (Savigny, 1820). [A Case of Parasitism of the Urethra by a Leech].—*Arch. Inst. Pasteur Algérie*. 9, 481-483.

The author of this paper reports a new site for the leech *Limnatis nilotica* in man, having come across a case of infection of the male urethra. Haemorrhage was the only symptom shown and the leech was removed by traction on the eighth day.

[This leech is an occasional parasite of the mucous membranes of man and of animals ; it is of common occurrence round the Mediterranean and has been accused in Morocco of mechanically transmitting the virus of infectious anaemia to horses. The new site reported in this paper is presumably as likely to be attacked in animals as in man].—E. L. TAYLOR.

DISEASES, GENERAL.

I. FARLEY, H. (1932). An Epizootological Study of Shipping Fever in Kansas.—*J. Amer. Vet. Med. Ass.* 80, 165-172. 3 tables. [2 refs.]

II. SCOTT, J. P., & FARLEY, H. (1932). Preliminary Bacteriological Report on Shipping Fever.—*Ibid.* 173-186. 6 tables. [12 refs.]

I. In this article the author records investigations into the circumstances giving rise to outbreaks of shipping fever, and gives the results of vaccination prior to movement of the animals and after arrival at their destination. It is recorded that inadequate shelter for recently shipped-in animals, movement during wet, cold and changeable weather and poor feeding were mainly instrumental in producing this disease. It was found that vaccination, whether done shortly before or subsequent to a journey, resulted in a larger number of deaths than in unvaccinated animals. A small number of sick animals were treated with an antiserum prepared against *Pasteurella bovisseptica* and a considerable reduction in losses resulted.

II. Investigations were undertaken during a field study of 125 herds of cattle. The characteristic lesions of croupous pneumonia, petechiae on serous membranes, haemorrhagic areas in the subcutaneous tissues and gastro-enteritis were found in all cases examined. The procedure was to take portions of lung, liver, spleen, kidneys, muscle, heart-blood, serous exudates, etc., to the laboratory for bacteriological examination. Rabbit and guinea pig inoculations were made from heart blood or exudates. *P. bovisseptica* was found in 80 per cent. of the 26 cases examined, but it is not stated from what material this organism was isolated—presumably it was from affected lung. Other organisms found were of the colon-aerogenes type and organisms of the brucella group mainly *Brucella bronchisepticus*. In a few cases diphtheroid organisms were found.

The authors, in a bacteriological examination at four routine autopsies (not shipping fever) were able to cultivate *P. bovisseptica*, and in three of these cases the organism is recorded to have been found in connection with the respiratory tract. They suggest that *P. bovisseptica* may be a primary bacteriological factor in shipping fever, but that the causative factor in the production of disease should be looked for elsewhere. JORGENSEN's work is quoted in which he isolated *P. bovisseptica* from the respiratory tract of 27 out of 250 normal cattle. The authors did a small number of inoculations into calves of their *P. bovisseptica* strain and in

some cases succeeded in producing a fatal result, their recorded doses being from 12 to 22 c.c. of agar culture emulsion of a density of tube 4 of the McFarland nephelometer.

The authors suggest that the causative factor in shipping fever is exposure and improper feeding and care of the animals, and that *P. bovisseptica* may only have had a "small place in the production of the final disease which caused death in exposed animals."—S. H. GAIGER.

SHAW, G. K. (1932). **Lichen Tropicus in Equines.**—*J. Roy. Army Vet. Corps.* **3.** 78-79.

Lichen tropicus is also known in India as "prickly heat," "summer rash," "mane and tail disease," "papular eczema," etc. It occurs in India most often in the coarser type of Australian horse and in the mule. The disease is seasonal, occurring only during the hot and rainy season and horses of a dark colour (brown and black) are more commonly affected than others. Many animals are affected year after year. The cause is unknown.

Attempts were made by the author to prevent the development of the lesions by bathing known susceptible animals once a day with a watery solution of sodium carbonate (1 : 320). Details of the success obtained with this lotion are not given, but it is claimed that the following skin dressing, combined with the internal administration of salines and sodium carbonate, cured the condition more quickly than any other:—creosote 1 part, camphor 2 parts, soft soap 4 parts, kerosene 4 parts, cocoanut oil 20 parts.

The mixture is rubbed into the affected areas on four successive evenings and each morning as much as possible is removed with a brush or rubber to avoid blistering by the sun. On the fifth evening the affected areas are washed with a 1 : 320 solution of sodium carbonate. The oily dressing is then reapplied and this procedure is continued until the condition clears up. Particulars are not given of the time taken to effect cures.—C. J. R. LAWRENCE.

— (1931). **Animal Health Investigations of the Australian Pastoral Research Trust. (d) Pizzle Disease.**—*J. Sci. & Indust. Res. Australia.* **4.** 137-138.

Investigations have been carried out in infected sheep from three districts and representative cases sent to the laboratories at Parkville. The disease has been known for many years in Australia and was at one time (1912) claimed by TIDSWELL to be due to *Actinomyces necrophorus*.

In its earlier stages this disease manifests itself as an affliction of the sheath and in one outbreak 75 per cent. of the wethers were found to be infected. A microscopical study of the early lesions and the fact that contagious pustular eruptions were present on the skin of other members of the flock, suggested to the investigators that a filtrable virus might possibly be the cause. This hypothesis has been tested out on several sheep and the results are sufficiently suggestive to warrant further work in this direction.—G. W. DUNKIN.

SCOTT, W. (1932). **Melanosis in Cattle.**—*J. Comp. Path. & Therap.* **45.** 141-149. 4 figs. [23 refs.]

The author records melanosis as an uncommon condition in cattle and quotes figures obtained at the Corporation Abattoir, Edinburgh, showing that, during the years 1928 to 1931, 16 cases of melanosis were encountered in 28,118 cattle slaughtered. During the same period 8 cases occurred in 17,627 calves slaughtered. The author bases his paper upon 10 cases out of 14 seen in bovines during the last two and a half years.

Conclusions are drawn that melanosis bears no relationship to the colour of the hide or sex of the animal, that the condition is more prevalent in calves than in adult cattle, that melanosis whether localized or generalized is a benign condition not interfering with the health of the animal and that harm would probably not result to human beings from the ingestion of affected tissue. Pigment was found both intracellularly and extracellularly. When small amounts of pigment were present the granules were gathered around the nucleus and extended outwards into the cell processes. The pigment mainly affected cells lying in the proximity of blood vessels, though an exception occurred in this respect in the adrenals. In the lungs a sharp line of demarcation was found between pigmented and unpigmented tissue. In the liver no pigmentation of the liver cells was seen and the serous coat of the liver appeared unpigmented. In generalized melanosis the heaviest pigmentation was in the kidney and adrenal region. It would appear that melanin production and the adrenals are inter-connected, but the nature of this relationship is undetermined. The author quotes from other investigators in support of his opinion that melanin formation is preceded by a colourless substance which by oxidation becomes melanin and that the colourless substance is closely allied to adrenalin.—S. H. GAIGER.

RUNNELLS, R. A. (1932). **The Histopathology of Cutaneous and Sub-cutaneous Nodules of Cattle.**—*J. Amer. Vet. Med. Ass.* **81**, 173-186. 6 figs., 2 tables. [19 refs.]

This article gives an interesting account of the histological appearances of skin nodules from 50 head of cattle. In all 56 lesions were examined. The investigation was undertaken in order to find out how much dependence can be placed upon the gross and microscopic appearance of cutaneous and sub-cutaneous nodules in arriving at a diagnosis of skin tuberculosis.

The skin lesions were removed mainly from the extremities, some were single, others in patches or chains. The smallest single nodule was three-eighths of an inch in diameter and the largest patch of nodules covered an area of 16 square inches. Most of the nodules were wholly within the hide, a few could be dissected easily from the under surface of the hide. A few had semi-fluid contents and several a heavy, light-yellow pus with calcareous granules. Others had thick fibrous capsules with fibrous septa running through the nodules, dividing them into spaces filled with inspissated yellow granular material. The smallest nodules resembled fibrous neoplasms. Over the nodules the epidermis was usually intact and hair was present. In a few cases a scar was present.

The histological study of these nodules enabled the author to divide them into three categories:—(1) pyogenic abscesses; (2) foreign body pseudotubercles and (3) tuberculous abscesses. There was difficulty in a few instances in making a differential diagnosis as between pyogenic and tuberculous abscesses and the suggestion is put forward that in such cases the pyogenic abscess may have had a tuberculous origin.

The conclusion is reached that the gross appearance of subcutaneous nodules cannot be entirely relied upon in determining the precise cause of the lesion and that microscopic examination of sections may in some cases still leave the diagnosis uncertain.

[This investigation would have been more complete and convincing had animal inoculations with the contents of the nodules been carried out].

—S. H. GAIGER.

I. BLOCH, C. E. (1931). *Følgerne af Vitaminmangel i Barnets første Leveaar.*

Caries dentium og Vitaminer. [After-Effects of Vitamin Deficiency in Infants during the First Year of Life. Dental Caries and Vitamins].—*Hospitalstidende*. 74. 265-281. 5 figs., 2 tables. [28 refs.]

- II. VOGT-MØLLER, P. (1931). Om Fremstilling af Vitamin E Praeparationer og om deres terapeutiske Anvendelighed hos Mennesket (habituel Abort) og Husdyr (Sterilitet). [Vitamin E Preparations and their Therapeutic Value in Man (Habitual Abortion) and in Domestic Animals (Sterility)].—*Ibid.* 567-570. [17 refs.]

I. Vitamin A deficiency in human beings has no specific harmful influence upon the formation and calcification of the teeth. It follows that a tendency to dental caries is not due to vitamin A deficiency in infancy. It is probable that this is also the case with deficiencies due to vitamins B and C. As guinea pigs are hypersensitive to vitamin C deficiency and their incisors are in permanent growth, it is not possible to infer that results obtained from experiments on guinea pigs yield results which are applicable to human beings. The main causes of dental abnormalities in human beings are abnormalities in mineral metabolism during the calcification of the teeth.

As a result of his extensive investigations on xerophthalmia (72 cases from 1912 to 1919) caused by vitamin A deficiency, the author states that in that condition the child mortality is high and that after the xerophthalmia has been treated successfully, scarcely two thirds of the children will survive to eight years of age. After this age development takes place normally. After recovery from vitamin A deficiency there are no characteristic signs or defects with the exception of advanced keratomalacia which almost always leads to reduced power of vision or blindness.

II. This is a note on vitamin E, its importance to the system and the pathological lesions produced by vitamin E deficiency in the food. The method of extracting the vitamin from wheat germ oil and of producing samples of considerable potency is described and reference is made to the work of H. M. EVANS and G. O. BURR. [(1927) "The Antisterility Vitamin Fat Soluble E." *Mem. Univ. California*. 8. 1].

Vitamin E seems to be an excellent therapeutic agent for the treatment of sterility in cows [see this *Bulletin*. 1. 172.] and it is considered that it should also prove of value in the treatment of habitual abortion in human beings.

—H. LORENZEN (DENMARK).

WOOFF, R. (1932). A Few Notes on Recent Losses in Cattle.—*Vet. Rec.* 12. 269-270.

RUTTER, J. V. S. (1932). A Few Notes on Recent Losses in Cattle.—*Ibid.* 299-301.

These articles concern a disease in cattle which is commonly reported as suspected anthrax. It appears to be confined almost entirely to cows and may occur in acute or chronic forms. Wooff considers that dehydration or gelatohydration changes in the blood, aggravated by repeated pregnancies or menstruation may cause the trouble; diet deficiencies may also play a part.

Rutter considers that the disease is definitely due to calcium deficiency and states that similar troubles occur in ewes. Treatment as for mineral and sugar deficiencies has given promising results, both as a curative and prophylactic. It is suggested that adverse weather conditions may affect the mineral and protein contents of natural foods.—NORMAN HOLE.

- I. SJOLLEMA, B. (1932). Onderzoekingen over de oorzaken van grastetanie. [Investigations into the Causes of Grass Tetany].—*Tijdschr. Diergeneesk.*

59. 57-80 and 329-351. [23 refs.] [Summaries in English, French and German : abst. from orig.]
- II. SJOLLEMA, B. (1932). Untersuchungen über die Ursachen der Grastetanie und der grossen Frequenzzunahme dieser Krankheit. [**Investigations into the Causes of Grass Tetany and the Large Increase in Incidence of this Disease**].—*Deuts. tierärztl. Wschr.* **40**. 225-229 and 245-250. [32 refs.]
- III. SJOLLEMA, B. (1932). Over de omstandigheden die volgens de ervaring in de praktijk van invloed zijn op het optreden van grastetanie. [**On the Factors influencing the Occurrence of Grass Tetany as disclosed by Experience in Practice**].—*Tijdschr. Diergeneesk.* **59**. 554-559.
- IV. SJOLLEMA, B., & SEEKLES, L. (1932). Der Magnesiumgehalt des Blutes besonders bei Tetanie. [**The Magnesium Content of Blood especially in Tetany**].—*Klin. Wschr.* **11**. 989-990. [4 refs.]

A group of papers dealing with "grass tetany" of Holland, formerly known as "kopziekte" or "kopfkrankheit" [literally "head sickness"] and corresponding to the English "lactation tetany."

The papers in Dutch and German overlap considerably and the group may therefore be abstracted as a whole and considered in relation to the recent review article of the senior author, Sjollema. (1932). [*Nutrit. Abst. & Rev.* **1**. 621].

The results of experimental research and of enquiry amongst veterinary practitioners and farmers led the authors to the conclusion that "grass tetany" has no simple single origin but is the resultant of several adverse influences operating about the time of transfer of cows from winter stalls to pasture, accentuated by the physiologically "labile" metabolism of early lactation. The changes in habituation to new surroundings, the influence of climatic factors (low temperature in particular) and the sudden alteration in type of nutrition, are regarded as disturbing the equilibrium of the endocrine organs and vegetative nervous system and precipitating an attack in animals already rendered susceptible by previous feeding on ill-balanced stall rations.

As against a common ratio of calcium to phosphorus of 1 : 1 in pasture grass, stall rations with much maize and little hay showed an adverse ratio of 1 : 9. On such a calcium-low ration experimental rabbits developed a condition suggesting latent tetany.

On the other hand the change to lush rapidly growing grass, although favourable in respect to Ca/P quotient involved sudden excess of potassium (3 to 4 per cent. or more) in proportion to sodium (0.1 to 0.2 per cent. or less), the presence of nitrates, and a high level of protein.

On the basis of observations in 1930 the authors advised a transitional period in 1931 involving a supplementary ration for the first few days to limit the consumption of grass, and stalling the cows at night to facilitate acclimatization. Farmers who followed this advice suffered no losses from grass tetany.

In Holland the disease occurs chiefly in spring and seldom in autumn, although rare cases have been recorded in the cold earlier period of the year in stalled animals fed on cut grass.

Incidence has much increased in recent years owing, in the author's opinion, to changes in the system of rationing and to heavy manuring of the pastures. Reports from farmers associated the disease with rich quick-growing grass and adverse climatic conditions, but not specially with parturition.

Of 357 cases studied in Holland in 1930, 55 per cent. occurred six weeks after calving and only 3 per cent. within four days of parturition. In relation to pasturing 46 per cent. of the cases were attacked in the first week, 28 per cent. in the second week, and 26 per cent. more than two weeks after the cows were put

out to graze. Thirteen cases out of 356 were affected within 24 hours.

In regard to age incidence 4·7 per cent. were two to three years old, 25 per cent. four to five years, 60 per cent. six to nine years, 8 per cent. ten years or more, but the figures have little significance since the numbers of cows in each age group varied considerably.

A questionnaire elicited case frequencies of 1 on 278 farms, 2 on 37 farms, 3 or more on 21 farms, with an upper limit of 5 to 10 cases. The question as to the occurrence of grass tetany in the previous year elicited 108 affirmatives and 233 negatives. The question as to how many of the animals were found in ditches was answered negatively in 325 cases and positively in 32 cases—a figure easy to understand in view of the loss of muscular co-ordination associated with the disease.

Symptomatology is variable but in general the muscles are rigid, the mouth closed spasmodically, the animal excited and irritable, with a wild look and hyperaemic mucous membranes of the eyes—in distinction to milk fever in which the tail is slack, the senses are dull, and the eyes show pale membranes and dreamy look.

Low magnesium content of the blood is very characteristic of the disease—0·5—1 mg. per cent. as against 1·3—2 mg. per cent. for normal blood. The Ca/Mg quotient is 14 in distinction to normal blood 6 and milk fever 2.

—H. H. GREEN.

COLES, J. D. W. A. (1932). **Three Forms of Leg-weakness in Chickens due to Dietetic Errors.**—*J. S. Afric. Vet. Med. Ass.* **3**. 76-78. [4 refs.]

This author differentiates leg weakness due to excessive magnesium carbonate in the diet, leg weakness due to a deficiency of the anti-paralysis factor (possibly vitamin G) and leg weakness due to "slipped tendon." Magnesium carbonate given in chick food, has been shown experimentally to cause swollen leg joints and lameness, with the toes turned outwards; the withdrawal of magnesium carbonate from the diet will result in recovery. In "slipped tendon" the Achilles tendon may be displaced, with swelling of the joint and the tendons; it appears that it may be caused by an ingredient of rice bran. Deficiency weakness can be distinguished from the other forms because the toes turn inwards and the hock is never affected; the feeding of sour milk caused the symptoms to disappear within a week in an outbreak described by the author.—NORMAN HOLE.

- I. HALI, G. E., & KING, E. J. (1931). **Calcium and Phosphorus Metabolism in the Chicken.** II. "Range Paralysis."—*Poultry Sci.* **10**. 259-268. 6 figs. [3 refs.]
- II. OBERLING, C., & GUÉRIN, M. (1931). Lésions d'ostéite fibreuse chez la poule, avec hypertrophie des parathyroïdes. [**Lesions of Fibrous Osteitis in Fowls with Hypertrophy of the Parathyroids**].—*C. R. Soc. Biol. Paris.* **108**. 1134-1136.

I. The authors discuss three distinct types of poultry disease passing under the name of "range paralysis," one a reflex type occurring as sequel to coccidiosis, another a form of paralysis following intestinal parasitic infestation, and the third a confused type sometimes called "slipped tendon" which follows some biological disturbance other than infection or infestation.

It is this third type which is dealt with experimentally in the paper and on the basis of histological, X-ray and chemical study of the bones (including phosphatase activity) together with blood analyses (Ca and P) it is concluded that the deformity is not due to abnormal composition of the bones.

The only abnormal findings were subluxation, medial or lateral rotation, exaggerated bowing of the tibia, wasting of the muscles and development of large amounts of tendon and cartilage.

II. A general paper discussing histological changes in the bony structures of pen poultry and describing lesions varying from those of rickets and osteomalacia to those of osteitis fibrosa.

Hypertrophy of the parathyroids is common in fowls and the authors consider that their own observations confirm those of DOYLE, MARINE and HIGGINS.

—H. H. GREEN.

- I. BURROWS, H. (1931). **Tumour resistance. I. Spontaneous Tumours occurring in Rats Refractory to Repeated Grafts of Jensen's Rat Sarcoma. II. Resistance to Tumour Grafts in Mice.**—*J. Path. & Bact.* **34**, 802-803.
- II. CRACIUN, E. C. (1931). Modifications histologiques du Greffon de sarcome de Jensen, comparaison avec les cultures de tissue. [**Histological Modifications of Grafts of the Sarcoma of Jensen compared with the Tissue Cultures**].—*C. R. Soc. Biol. Paris.* **108**, 309-311.
- III. SORU, E. (1931). Le potentiel d'oxydo-réduction des tumeurs spontanées de la Souris et du sarcome de Jensen. [**The Oxygen Reduction Potential of Spontaneous Tumours of the Mouse and of Jensen's Sarcoma**].—*Ibid.* 327-328. [3 refs.]

I. The author records that during a period he regrafted with Jensen's sarcoma every rat in which an initial graft had failed to grow or, having grown for a while, had receded. Among 53 rats, a second grafting was successful in two cases in which the primary grafts were small. No Jensen's rat sarcoma was established by a third or subsequent inoculation. Five cases are reported of rats which had proved refractory to grafting and were subsequently found to have tumours. From these cases it may be concluded that a rat which is completely resistant to grafts of Jensen's sarcoma is not thereby rendered immune against spontaneously developing tumours.

Similarly mice which had been grafted with a tumour and in which the tumour had failed to take or, having taken, subsequently retrogressed, were regrafted with mouse carcinoma 63. It would appear that a prior grafting with mouse sarcoma 37 gave complete resistance against one subsequent regrafting with mouse carcinoma 63.

II. In both cases following inoculation a new mass of cancer tissue is formed. *In vivo* the cells are more or less uniform and of the fibroblast type, whereas *in vitro* the cells show a polymorphism and plasticity which appears to be an adaptation of the cells under these special conditions.

III. The electrometric apparatus used for the determination of pH was used in these experiments, the platinum electrode being introduced into the tumour or the healthy tissues of the living animal. The findings show that the tumour tissues have a greater affinity for oxygen than healthy tissues.

—NORMAN DOBSON.

IMMUNITY.

BLOM, T. (1932). Kvarkvaccinens skyddsvärde prövat på häst, med efterföljande infektion med kvark streptokocker. [**Tests of the Protective Power of Strangles Bacterin on Horses against a Subsequent Infection with Strangles Streptococci**].—*Skand. Vet.-tidskr.* **22**, 3-18. 4 figs., 4 tables.

Out of 12 two-year-old horses of the Icelandic breed which had not suffered from strangles, nine were each treated subcutaneously with a dose of 15 c.c. of a suspension of strangles streptococci of one strain, killed by boiling and suspended in carbol saline, and three were left untreated as controls. A fortnight to six weeks later all the horses were given an intravenous injection of 100 c.c. of an 18-hour bouillon culture of such a virulence that 0.4 c.c. caused death within 24 hours when injected subcutaneously into mice.

Three days later the horses were injected with 300 c.c. of virulent culture. The nine vaccinated experimental horses died from strangles 11 to 46 days after the first injection and the three unvaccinated ones 12 to 21 days after the first injection. The *post-mortem* examination showed strangles abscesses in various organs. The protective value of strangles vaccine on horses was thus very small and of short duration.—N. LAGERLÖF (STOCKHOLM).

GRAHAM, R., THORP, F., & PARK, S. E. (1932). **A Note on the Intradermal Injection of *Streptococcus epidemicus* Filtrate in Animals.**—*Cornell Vet.* 22. 56-61. [15 refs.]

There appears to be little doubt that epidemic sore throat in human beings may be milk-borne and that the bovine udder may be a carrier of *Str. epidemicus*. The avenue by which milk becomes infected is not agreed upon; the most generally accepted one is stated to be that the bovine udder may become infected with streptococci from the throats of infected milkers. Experiments were carried out by smearing a culture of *Str. epidemicus* over the external orifice of the right and left front teat canal of a cow. Clinical mastitis developed in one quarter and it is suggested that teat or udder trauma may not be necessary for *Str. epidemicus* to gain entrance into the cow's udder. The culture had been isolated from a previous case of mastitis and it is suggested that as its pathogenicity had not altered it may well be that *Str. epidemicus* bovine mastitis in a herd might be traceable to an infected bovine and not necessarily to a human throat.

No reactions occurred following the intradermal injection of *Str. epidemicus* filtrate into three cows, a pig and a calf.—R. LOVELL.

COPE, Elizabeth J., & HOWELL, Katharine M. (1931). **Local Skin Reactivity to "Filtrates" of *Pneumococcus*.**—*J. Infect. Dis.* 48. 570-575. [8 refs.]

An attempt has been made to determine whether the phenomenon of local skin reactivity (Shwartzman) which is elicited by injecting a small amount of a toxic bacterial filtrate intradermally into the shaved or depilated skin of the rabbit and following this with a much larger dose intravenously, 24 hours later, would be of service in determining types amongst pneumococci.

The phenomenon was given by a solution of pneumococci in bile, but not by filtrates prepared by methods in which the cell body was not disintegrated. In 16 out of 36 experiments in which the same type was used for both injections a positive result was obtained. In five out of 36 experiments in which the second injection was of different type, the result was positive. In one out of four experiments in which one of the injections was a bile solution of pneumococci and the other a filtrate from meningococci a reaction was obtained.

Local skin reaction was not produced by egg white, dilute-bile, ascites broth, spinal fluid or horse serum. It was rarely produced by human serum or by a mixture of bile, ascites broth and salt.—A. W. STABLEFORTH.

WADSWORTH, A., & BROWN, Rachel. (1931). **Chemical and Immunological Studies of the *Pneumococcus*. I. A Specific Antigenic Carbohydrate of**

Type I Pneumococcus.—*J. Immunol.* **21**, 245-253. 3 tables. [21 refs.]

Virulent Type I pneumococci were grown in infusion-free peptone dextrose broth for $15\frac{1}{2}$ hours. The organisms from 35 litres were removed and washed. From the supernatant and washings the specific carbohydrate was isolated by the method of HEIDELBERGER and AVERY. The organisms were resuspended in 0.002 N sodium hydroxide and repeatedly frozen and thawed. A carbohydrate substance was obtained by repeated precipitation with alcohol and purification with acetic acid and sodium hydroxide. The yield after finally washing with absolute alcohol and ether and drying over calcium chloride was about 400 mg. It was extremely soluble in water; protein tests were negative and carbohydrate tests positive. Precipitation occurred at a dilution of 1:6,000,000 with Type I antipneumococcus serum, and at 1:600,000 with this serum after complete absorption with the specific carbohydrate of HEIDELBERGER and AVERY.

It is concluded that the carbohydrate described is similar to that of SCHIEMANN and his co-workers and to that of ENDERS [see this *Bulletin.* **2**, 394.], but distinct from the specific carbohydrate of HEIDELBERGER and AVERY.—A. W. STABLEFORTH.

JULIANELLE, L. A., & MORRIS, M. C. (1932). Reactions of Rabbits to Intracutaneous Injections of Pneumococci and their Products. VIII. The Interrelationships of Hypersensitiveness to Pneumococcus and Streptococcus.—*J. Exp. Med.* **55**, 867-876. 1 fig., 3 tables. [12 refs.]

The pneumococci used were S strains of Types I and II and an R strain of Type II: the streptococcus was not haemolytic or green producing. Following intracutaneous injections of heat-killed S or R pneumococci or of streptococci, rabbits acquired an increased skin reactivity to the nucleoprotein of both organisms. Injections of pneumococci were followed in some rabbits by an eye sensitivity to pneumococcus protein, but not to streptococcus protein, nor to suspensions of either living organism. Injections of streptococci were sometimes followed by eye sensitivity to suspensions of living streptococcus, but not to R pneumococcus nor to the nucleoprotein of either organism.

The sera of rabbits injected with either organism contained agglutinins for both R pneumococci and streptococci. Only those animals injected with pneumococci acquired resistance to pneumococcal infection.—A. W. STABLEFORTH.

SORDELLI, A., & FERRARI, J. (1931). Les anticorps du sérum anticharbonneux. [The Antibodies of Anti-anthrax Serum].—*C. R. Soc. Biol. Paris.* **106**, 145.

The authors prepared four types of serum by subcutaneous or intravenous injections of horses with virulent or avirulent anthrax bacilli. Each serum was divided into two fractions, the soluble and insoluble portions in distilled water saturated with carbon dioxide. Three products were thus compared, namely, the original serum, the insoluble and the soluble portions. Agglutinins appeared in the serum produced intravenously, whilst they were absent in the serum produced by subcutaneous injection. Otherwise it is stated that agglutinins and precipitins were contained in the insoluble portion of the serum, whilst complement fixing bodies were found in the soluble portion and were more abundant in the serum prepared by subcutaneous injection. The Neisser-Wechsberg phenomenon which is somewhat comparable to a zone phenomenon, was apparent in the complement fixation experiments with whole serum, but tended to disappear when the fraction of the serum was used.—R. LOVELL.

I. BUC, E. (1932). Action des sérosités organiques et des exsudats sur la bactériolyse du Bacille tuberculeux par les tissus. [Action of Organic

Humours and Exudates on the Bacteriolysis of Tubercle Bacilli by the Tissues].—C. R. Soc. Biol. Paris. 109. 727-729.

- II. ZEITOUN, E., & GLUSCOFF, N. (1932). *Bacilles tuberculeux avirulents et exotuberculine. [Production of Tuberculin by Avirulent Strains of Tubercle Bacilli].—Ibid. 110. 155-157. [8 refs.]*
- III. STYLIANOPOULOS, M., & ANANIADÈS, B. (1932). *Abcès de fixation chez les cobayes tuberculeux ; leur influence sur les réactions allergiques. [The Influence of a Fixation Abscess on the Tuberculin Test in Guinea Pigs].—Ibid. 440-442.*

I. It is well known that tuberculous tissues rapidly lose their virulence for guinea pigs when kept *in vitro* at 37° C. When preserved in liquid media, the nature of the liquid and its pH exercise a considerable effect ; for example, tuberculous tissues remain virulent for a longer period in pleural or organic exudate than in normal saline or in Locke's solution.

Buc found that pieces of liver from tuberculous guinea pigs that had been bled to death, when suspended in guinea pig serum and incubated at 37° C., were still virulent 30 days later ; when suspended in pleural exudate the liver was virulent 20 days later, whereas in normal saline it was avirulent by the fifth day. In two other experiments similar results were obtained.

II. Zeitoun and Gluscoff point out that there is no correlation between the virulence of strains of tubercle bacilli and their capacity to produce tuberculin.

III. Stylianopoulos and Ananiadès carried out observations on guinea pigs to ascertain the effect of an artificially created abscess on the reaction to the intradermal tuberculin test.

It was found that, in guinea pigs presenting ulceration following abscess formation, the reaction to the tuberculin test was quicker to appear, but less intense than in controls.—T. M. DOYLE.

LOVELL, R. (1932). **The Presence of Agglutinins for Bacteria of the Salmonella Group in the Sera of Normal Animals. A Preliminary Report.**—*J. Comp. Path. & Therap.* 45. 27-42. 12 tables. [25 refs.]

The author has tested the sera of normal swine, normal cattle, normal sheep and normal horses for agglutinins of the flagellar antigens of *Bact. paratyphosum* B, *Bact. aertrycke*, *Bact. newport*, *Bact. reading*, *Bact. derby*, *Bact. suispestifer*, and *Bact. enteritidis*. Two hundred and two swine were examined and 190 sera contained agglutinins against one or more organisms, chiefly *Bact. paratyphosum* B and *Bact. suispestifer*. In two cases a titre of 11,640 was obtained against *Bact. suispestifer*. Female swine sera contained antibodies more frequently than male sera. Thirteen out of 23 cattle reacted, chiefly for *Bact. aertrycke*, *Bact. newport*, *Bact. suispestifer* and *Bact. enteritidis*. *Bact. suispestifer* and *Bact. aertrycke* antibodies were most common in sheep, 33 of which reacted out of 43 tested. Eighteen out of 20 horses reacted, chiefly for *Bact. reading*, *Bact. newport* and *Bact. suispestifer*. The *Bact. reading* infection was especially noteworthy, but all the horses came from the same area. It seemed that in young cattle and sheep normal agglutinins were absent.

Culture attempts made with 132 samples of the organs and intestinal contents of 40 healthy pigs failed to yield any salmonella or antigenically related organisms. The author therefore concludes that the agglutinating power of a serum is not in itself a criterion of infection with the particular organism.—NORMAN HOLE.

- I. JAMES, W. A., & GRAHAM, R. (1931). **The Effect of Colloidal Carbon with Adsorbed Flavines on the Brucella Agglutinin Titre of Reacting Cows.**—

J. Amer. Vet. Med. Ass. **79**. 894-896. 1 table. [1 ref.]

- II. THOMPSON, W. M., & THOMPSON, H. M. (1931). **Agglutinins in Extracts prepared from the Tissues of Guinea Pigs infected with *Brucella abortus*.**—*Ibid.* 790-797. 3 tables. [8 refs.]
- III. STARR, L. E. (1931). **Serological Study of a Polyvalent Antigen of *Alcaligenes abortus* (Bang).**—*Ibid.* 798-802. 4 tables.

I. James and Graham tested the alleged bactericidal properties of a combination of colloidal carbon and flavine dyes for *Br. abortus* in the tissues of affected animals. No evidence was found that the combination was of any curative value for affected animals.

II. The object of these experiments was (1) to determine if agglutinins for *Br. abortus* could be detected in extracts of various tissues of infected guinea pigs and (2) whether the cells of one organ produce agglutinins independently of those of another organ. Extracts were prepared by pulping the tissue, diluting it with normal saline, centrifuging and using the supernatant fluid for the agglutination test. Agglutinins were demonstrated in some organs of guinea pigs infected with *Br. abortus* and were absent from others.

Agglutinin production appears to be a local process in its relation to various organs of the body.

III. Starr carried out comparative agglutination tests with different lots of *Br. abortus* antigen in order to ascertain:—(1) the optimum concentration for sodium chloride in the antigen, (2) the advantages or disadvantages of heating antigen and (3) effect of incubation of the tests at temperatures of 37° and 55° C.

Antigens containing 4, 8 and 12 per cent. concentrations of sodium chloride gave the clearest results; 8 per cent. appeared to be the optimum concentration. When made up with normal sodium chloride there were more incomplete reactions and there was a greater tendency to pro-agglutination. Unheated antigen kept in cold storage gave more satisfactory results than unheated antigen kept at room temperature. Heating the antigen tended to lower the titre and resulted in more incomplete reactions.

There appeared to be no appreciable difference in the results obtained in tests incubated either at 37° or at 55° C.—T. M. DOYLE.

- I. HAVENS, L. C., & MAYFIELD, C. (1932). **Flocculation Tests for the Differential Diagnosis of Smallpox and Chickenpox.**—*J. Infect. Dis.* **50**. 242-248. 2 tables. [3 refs.]
- II. CRAIGIE, J. (1932). **The Nature of the Vaccinia Flocculation Reaction, and Observations on the Elementary Bodies of Vaccinia.**—*Brit. J. Exp. Path.* **13**. 259-268. 5 tables. [21 refs.]

I. The sera of smallpox patients or smallpox-vaccinated patients flocculate antigens made from virus-containing rabbit brains or from smallpox scabs; chickenpox sera flocculate not at all or in low dilution only. It is shown by absorption tests that this chickenpox flocculation is at least in part non-specific, due to the presence of secondary invading organisms.

II. The flocculation reaction that can be obtained between rabbit vaccinia antigens and immune serum is in part an agglutination and in part a precipitation. The precipitin reaction is obtainable with Seitz E. K. filtrate antigens, whilst the elementary bodies (Paschen bodies) are agglutinated. Absorption tests show that Paschen bodies remove the precipitin as well as the agglutinin; similarly the filtrate antigen also removed the agglutinin. The author therefore concludes that the filtered substance is a specific product of the Paschen bodies. Additional

evidence is given in support of the theory that Paschen bodies are the virus of vaccinia.—NORMAN HOLE.

NIEBERLE, K. (1931). Das Problem der Allergie und allergische Erkrankungen beim Menschen und Tier. [The Problem of Allergy and Allergic Disease in Man and Animals].—*Tierärztl. Rdsch.* **37**, 863-867 and 881-884.

The author first draws attention to the always increasing number of diseases in which allergy is shown or suggested to play a part and the new light in which long recognized diseases are thereby placed. Dividing allergic conditions into those due to anaphylactic reactions and those included in the term "tissue allergy," he then considers the nature of anaphylaxis, active and passive, general and local, noting its specific character and the various methods used for its demonstration, finally passing to the naturally occurring conditions in which it plays a part. Those considered include serum sickness, idiosyncrasies (asthma, hay-fever, those associated with ingestion of certain foods, urticaria and shock) under which heading are considered hereditary and post-embryonic factors, ecchinococcus allergy, tuberculin and mallein reactions, the skin reactions in swine erysipelas which may be typically anaphylactic, and the question of allergy in rheumatism and various joint conditions.

Detailed consideration is given to the endocarditis and thrombosis which occur in horses used for serum production, in swine erysipelas and in chronic septic conditions.

The author contrasts the speed with which bacteria are removed from the circulation by the reticulo-endothelial system of an animal which has been sensitized by a previous injection of the same organism, with the much slower removal in an unsensitized animal, and the comparative speed with which the phagocytosed organisms finally disappear from the endothelial cells of the liver, spleen and other organs by which they have been removed.

It is suggested that hyaline thrombi originate in a bacterial disturbance of the normal relations between the blood plasma and endothelial cells resulting in the formation of a fine network of fibrin which may be resorbed or increased according to the fate of the bacteria. The removal of bacteria which occurs in the liver and spleen of an unsensitized animal may be extended to the vessels of skin, endocardium, kidneys or general connective tissue of a sensitized animal.

It is recalled that one intravenous injection of bacteria is not followed by endocarditis and that if an attempt is made to damage the valves simultaneously the result is not marked, but that if the same bacteria are again injected after a given interval the result is entirely different. The author attributes this to sensitization with a resultant extension of phagocytic activity to the endothelium of the valves.

This alteration in the condition of endothelium of valves or other parts is regarded as the essential and the occurrence of endocarditis or thrombosis in the presence of various bacteria is thus attributed to allergic processes.

The idea that periarthritis nodosa is confined to syphilis is rejected and the condition also viewed as allergic.

Tuberculosis is discussed from the point of view of the various forms which the disease may take depending primarily on the sensitized or unsensitized state of the tissues and the consequent resistance. From this standpoint are considered the spread within the body after a primary infection, the course in an already infected animal and the entirely different nature of the lesions which may be caused in the same organ. The author is emphatic that, in chronic tuberculosis of the udder and of other organs, caseation and calcification are conspicuously

absent. He stresses also the frequency of this chronic type of tuberculous mastitis which is responsible for the excretion of enormous numbers of tubercle bacilli, but which, he believes is seldom recognized because it has few of the characters of tuberculosis as usually seen in other organs and is not associated with changes in the lymphatic glands.

Reference is made to the classical experiments of KOCH on guinea pigs and those of BIELING and SCHWARTZ on rabbits.

A comparison is also drawn between the type of tuberculosis which occurred in Senegal negroes when brought to Europe and that which normally occurs in children and monkeys which have not previously been exposed to infection.

—A. W. STABLEFORTH.

MICHAÏLOWA, E. I., & WELIKANOFF, I. M. (1931). *Aktive Immunisierung mit Anatoxin gegen Tetanus*. [**Active Immunization against Tetanus with Anatoxin**].—*Zlb. Bakt. I. (Orig.)*. **123**. 43-49. 11 tables.

Experiments were carried out on mice, guinea pigs and a rhesus macaque monkey with tetanus toxin and anatoxin. Minimal lethal doses were established for tetanus toxin in mice and in guinea pigs, 1/1,000,000 c.c. for the former and 1/50,000 c.c. for the latter. Mice were not affected with 1 c.c. of anatoxin nor guinea pigs with 9 c.c. Having thus proved the harmlessness of the anatoxin and the potency of tetanus toxin, experiments showed that it was possible to immunize guinea pigs actively with anatoxin and they then withstood up to 100 lethal doses of toxin. Mixtures of the sera of immunized guinea pigs and tetanus toxin proved harmless to other guinea pigs.

The serum of a monkey gave no protection before immunization, but later gave adequate protection to mice and the serum was still potent one year after immunization.

The harmlessness of anatoxin and the efficacy of its action are pointed out.

—R. LOVELL.

PHYSIOLOGY.

HETHERINGTON, Mary. (1931). **The State of Water in Mammalian Tissues**.—*J. Physiol.* **73**. 184-188. 2 tables. [2 refs.]

A limited amount of strong salt solution was injected into the blood stream of anaesthetized cats and the osmotic pressure of the blood measured at intervals. Within half an hour a steady state appears to be reached and, assuming that the injected fluid is now in final equilibrium with all the available water in the body, the amount of this available water can be calculated from the change in osmotic pressure. It is found that the mean value of the "available" water is 59 per cent. of the body weight. As the total water in the cat's body is approximately 63 per cent., the conclusion is reached that nearly all the water present in the tissues is available to take part in osmotic interchanges between blood, tissues and cells.

—W. R. WOOLDRIDGE.

BARBOUR, H. G., & MARSHALL, H. T. (1931). **Heat Regulation and Water Exchange. XII. The Underlying Mechanism of Fever as illustrated by Cocaine Poisoned Rabbits**.—*J. Pharmacol. & Exp. Therap.* **43**. 147-162. 2 figs., 1 table. [35 refs.]

An attempt has been made to trace the water which is lost from the blood during fever. A typical fever with immediate rise in temperature and an increase

in metabolism was produced by inoculating rabbits with a standard dose (40 mg.) of cocaine hydrochloride. When curves of the temperature and of the increase in specific gravity of the blood were plotted it was found that each phase of the temperature curve was preceded by a similar phase in the specific gravity curve, thus suggesting a causal relation.

Rabbits were killed in the early stages of cocaine fever and their organs and tissues examined as to their water content by a standard technique. No indication of an increase in the water content was found in the brain, skin, muscles or body cavities, but the increase in the water content of the liver was sufficient to account for the amount of water lost from the blood. It is suggested that this concentration of body fluid in a central area of the body would result in an inability to eliminate heat and a positive heat balance, with rising temperature, would be the inevitable result.—R. S. ROBERTS.

BUXTON, P. A. (1931). **The Law Governing the Loss of Water from an Insect.**—*Proc. Entomol. Soc. London*. **6**. 27-31. 2 figs. [6 refs.]

It is pointed out that if we have two atmospheres at different temperatures, both of which are 50 per cent. saturated, it will require a greater amount of water to complete the saturation of the hotter atmosphere than of the colder, that is, the "saturation deficiency," which is a measure of the amount of water required for saturation, is different for the two atmospheres although the relative humidities are the same.

Other things being equal, it is known that the rate of loss of water from an open surface is almost directly proportional to the saturation deficiency. This has been shown to hold generally for plants and mammals and the author examines the experimental data already in the literature to see whether the law applies to insects.

It is shown that the law of saturation deficiency applies, within certain temperature limits, both to eggs and to adult insects of several different orders. It is suggested that entomologists would be wise to use the saturation deficiency scale and not that of relative humidity. It is then possible to compare two places or two seasons and say that they are identical or not in saturation deficiency, that is to say, in the amount of loss of water which would take place from an insect.

—W. R. WOOLDRIDGE.

- I. CAMPBELL, K. W. D. (1931). **The Effect of Night on Milk Production.**—*J. Dairy Res.* **3**. 52-60. 6 figs., 2 tables. [9 refs.]
- II. BROOKS, H. J. (1931). **The Influence of Environmental Temperature on the Percentage of Butter Fat in Cow's Milk.**—*J. Dairy Sci.* **14**. 483-493. 4 tables, 2 graphs. [11 refs.]

I. In this paper experiments are described which were made to ascertain whether the factors associated with night or the longer period since the previous milking are responsible for the fact that early morning milk has a lower fat content than afternoon milk. The milks from six cows were examined during winter months, the cows being milked twice daily for some time at 6 a.m. and 3.30 p.m. This was followed by a period of milking at 6 a.m. and 9 p.m. In this way the animals were milked daily at intervals of 9 and 15 hours, but the latter period occurred first at night and later during the day. Each cow produced a greater percentage of its daily yield of milk after the longer interval when that interval was from night to morning than when it was from morning to night, that is to say the reversal of the twixt-milking periods has not resulted in the evening milk becoming equal to the usual morning milk. The author concludes that, as far as

winter conditions are concerned, night itself or factors operating at night tend to high milk production of low fat content.

II. A study has been made of the influence of environmental temperature in the percentage of butter fat in cow's milk. By taking records over a year from the same number of animals, with an equal number of them freshening each month and selecting so that the breeds were equally represented, the author claims to have eliminated the effect of such factors as the stage of lactation and gestation, condition of animal, feeding and breed differences. The collected data show that there is a close inverse correlation between the percentage of butter fat in cow's milk and the environmental temperature and that this holds for the four breeds studied. The temperatures varied between 29° and 77·9° F. and the butter fats varied with the breed as follows :—Jersey—5·64 to 4·75, Guernsey—4·80 to 4·38, Ayrshire—3·96 to 3·63 and Holstein—3·49 to 3·26 per cent. From his results the author also concludes that the environmental temperature exerts a greater influence in the percentage butter fat of cow's milk than does the stage of lactation.—W. R. WOOLDRIDGE.

THERAPEUTICS.

- I. SEELEMANN, M. (1932). Die erfolgreiche Behandlung des gelben Galtes mit Rivanol und Entozon. [**The Successful Treatment of Streptococcal Mastitis with Rivanol and Entozon**].—*Tierärztl. Rdsch.* 38. 262-264.
- II. SEELEMANN, M. (1932). Experimente und Beobachtungen an Milchkühen im Rahmen der Galtforschung. III. Beitrag zur erfolgreichen Behandlung der Streptokokken-infektionen des Euters mit Rivanol. [**Experiments and Observations on Milch Cows in Connection with Research into Mastitis. III. Contribution to the Successful Treatment of Streptococcal Infection of the Udder with Rivanol**].—*Arch. wiss. prakt. Tierhkl.* 65. 83-93. 3 figs. [2 refs.]

I. In this preliminary note the author reports success with the chemotherapy of streptococcal mastitis by the use of udder infusions with solutions of rivanol and entozon [see this *Bulletin*. 2. 252]. This method has been tested on "considerable numbers" of cases and the author concludes that a substantial percentage of diseased udders can be cured (rendered free from streptococci); one to three infusions are given, preferably, but not necessarily, during the dry period.

This paper contains a set of instructions for veterinary surgeons relating to the indications and technique for the treatment [dealt with below].

II. The second paper covers much the same ground as the first one, but contains in addition selected case records of treated cows, with tables showing the results of examinations of the bacterial flora and cell contents and of catalase and chloride tests and the total amount of milk secreted over the treatment period.

The technique of the experimental treatment was varied widely in order to find the various optimal factors concerned and the following is that finally chosen :—the quarter is well massaged and milked out, the teat is cleaned with alcohol and a preliminary infusion with 100 c.c. of the antiseptic (followed by extraction) is carried out. Then follows the main infusion with the solution at body temperature, using rivanol at 0·25 to 0·3 : 1,000 or entozon at 1 : 1,250 in distilled water. The quarter is loosely filled with the solution and well massaged and, in the case of cows in milk, the solution is milked out after five minutes. In dry cows it is left in over night and is then milked out. Dry cows should be

treated again after an interval of a week ; in the case of cows in milk, further treatment should depend upon the progress of the case. Cows under treatment should be milked three times daily.

Laboratory milk examinations are required during the period of treatment and the progress of the case is judged and decided on the results obtained. Success depends upon co-operation between the herd owner, the practitioner and the laboratory.—J. E.

- I. HOFFMAN, W. A. (1931). **Intestinal Parasiticides.**—*Porto Rico J. Publ. Health & Trop. Med.* **7**. 51-67. 1 table. [29 refs.]
- II. —. (1931). Tabakstaub zur Bekämpfung von Ungeziefer und Darmwürmern in Geflügelbeständen. [**Tobacco Powder in the Control of Lice and Intestinal Worms of Poultry**].—*Deuts. tierärztl. Wschr.* **39**. 731-732.

I. This paper gives a few notes on the more important anthelmintics and their uses, principally in the human subject. The author has obtained several successful results in the expulsion of tapeworms with carbon tetrachloride where other remedies have failed. This drug has proved very valuable in treatment for fascioliasis in sheep in Porto Rico, 7 c.c. doses being well tolerated : no mention is made of poisoning occurring in these animals, but the drug is regarded as too dangerous for use in cattle.

II. Tobacco powder may now be obtained in Germany duty free for use in the control of poultry parasites.—E. L. TAYLOR.

- TOURNIER, E. (1931). La chimiothérapie de la dracunculose. [**The Chemotherapy of Dracunculosis**].—*Ann. Méd. Pharm. col.* **27**. 138-147. [22 refs.]

The author reviews the literature on the treatment of dracunculosis with preparations of arsenic and antimony. He concludes, from the work of others and from his own experience with antimony, that preparations of both of these elements are of great value for the destruction of the guinea worm, *Dracunculus medinensis*. Further work is, however, required on the manner in which they may most suitably be administered and particularly is this so with arsenic, many useful preparations of which have not yet been tried.—E. L. TAYLOR.

- HASSAN, A. (1931). **A Comparison of the Relative Killing Power of some Colloidal Metals on the Schistosome Cercariae of the Human Type.**—*J. Egypt. Med. Ass.* **14**. 405-414. 25 tables.

Cercariae of *Schistosomum haematobium* and *S. mansoni* freshly obtained from *Planorbis bullinus* were placed in colloidal solutions of various metals of different strengths and observations made under the microscope for cessation of movement. Results are summarized in a table which shows the concentration of the various metals causing death in one hour. Colloidal calcium effected this in a concentration of 1 : 100,000, colloidal gold 1 : 80,000, colloidal antimony 1 : 40,000, colloidal arsenic 1 : 20,000, colloidal copper and colloidal iodine 1 : 8,000 and colloidal bismuth, iron, silver, manganese and mercury each in a concentration of 1 : 4,000.

Calcium was thus shown to be particularly effective and trials were carried out with calcium chloride to ascertain whether it might prove of any value for control purposes ; the results were, however, disappointing and it was found that a solution of 1 : 20 was required to kill the cercariae within an hour.—E. L. TAYLOR.

- CRUESS, W. V., RICHERT, P. H., & IRISH, J. H. (1931). **The Effect of Hydrogen-ion Concentration on the Toxicity of Several Preservatives to Micro-**

organisms.—*Hilgardia, California*. 6. 295-314. 2 figs., 16 tables. [12 refs.]

Marked irregularities have occurred in the commercial preservation of food products by means of sodium benzoate or of sulphurous acid. It was suspected that the hydrogen-ion concentration of the medium played an important rôle. Working with sodium benzoate it was stated that spoiling of foods such as asparagus, green peas, etc. could be prevented with 1 : 10 of 1 per cent. or less of sodium benzoate when the pH value did not exceed 4.0. Near neutrality 2 per cent. of sodium benzoate failed to prevent growth of moulds, yeast and bacteria ; so with sodium salicylate, at least 150 times a greater concentration was required at pH 7.0 than at pH 2.5. A similar type of result was obtained with sulphurous acid and potassium acetate. Although similar, the results were less pronounced with sodium chloride and formaldehyde.—R. LOVELL.

PULLES, H. A. (1931). Iets over de intraveneuze infusie van geneesmiddelen speciaal bij grastetanie en paresis puerperalis bovis. [**The Intravenous Injection of Medicinal Agents, particularly in Bovine Puerperal Paresis**].—*Tijdschr. Diergeneesk.* 58. 1934-1942.

The author claims good results in the treatment of milk fever and grass staggers by the intravenous injection of 250 c.c. of water containing 27 g. calcium chloride and 8 g. magnesium chloride. Emphasis is laid upon the necessity for injecting the solution very slowly and keeping a close watch on the action of the heart. Should the heart-beat become at all irregular the injection must be stopped immediately.—A. LESLIE SHEATHER.

PUBLIC HEALTH.

SCHWERDT. (1931). Fleischverkehr. [**The Meat Trade**].—*Berl. tierärztl. Wschr.* 47. 754-755.

Summaries of :—(a) a report on the future prospects of markets for animal food products, showing the consumption of different kinds of meat ; (b) the regulations regarding minced-meat in Saxony ; (c) the French tariff on meat imported from Germany and (d) statistics showing the increase in the consumption of meat in Prussia.—F. BULLOCK.

POISONS AND POISONING.

RAMSAY, A. A., & SEDDON, H. R. (1931). **Arsenical Poisoning in Stock from the Ingestion of Vegetation sprayed with Arsenic.**—*Vet. Res. Rep., Dept. Agric., New South Wales*. 1931. No. 6 pp. 58-69. 6 tables.

A record of investigations on the feeding of calves on a maize crop experimentally destroyed by spraying with an arsenical poison commonly used for destruction of prickly pear.

The data are of special value in consideration of the facts that the amount of arsenic ingested with the leaves is recorded, the distribution of arsenic over the various tissues of the body is determined, and the location of arsenic in the animal body at various intervals after administration is discussed—information which, for obvious reasons, is rare in the literature of arsenical poisoning in the human subject.

The selection of corpora relictata for chemical analysis is considered and the fatal dosage of soluble arsenic for the bovine is discussed. Regarding the latter

point the figure is given as 4 mg. per lb. body-weight (arsenic expressed as As_2O_3) and treated as in line with the quoted results of GREEN and DIJKMAN [(1918). *S. Afric. J. Sci.* **15**, 640 and (1918). *7th & 8th Rep. Direct. Vet. Res.* pp. 689-698.—see also GREEN. (1916). *5th & 6th Rep. Direct. Vet. Res.* pp. 488-538]. Regarding the former point the author considers that in cases of arsenical poisoning the faeces, urine and contents of the large bowel are specimens which might be expected to show relatively high figures for arsenic and that although the "kidney and liver should not escape examination they do not seem so suitable as the other specimens noted."

[It may be remarked that GREEN advocated examination of rumenal contents and liver as the relicts most readily obtained from the field and as providing most information on two analyses only—the rumenal contents reflecting arsenic still unabsorbed and available for detection of the chemical nature of the compound ingested, and the liver as indicating the extent and route of ingestion].

—H. H. GREEN.

MINOT, A. S. (1931). **The Mechanism of the Hypoglycemia Produced by Guanidine and Carbon Tetrachloride Poisoning and its Relief by Calcium Medication.**—*J. Pharmacol. & Exp. Therap.* **43**, 295-313. 2 tables. [25 refs.]

It has already been shown that injections of guanidine hydrochloride are capable of producing intoxications almost indistinguishable from carbon tetrachloride poisoning and that experimental guanidine poisoning can be relieved by intravenous injection of calcium salts.

The experiments here reported were carried out on rats to investigate this relationship between guanidine and carbon tetrachloride poisoning a little further. The procedure followed was to inject the test substances (guanidine hydrochloride, glucose and calcium chloride) and at the end of the experimental period to collect the blood of the rat for lactic acid determination, then to take out the liver, skin the carcass and place all except the skin in carbon dioxide snow, and subsequently to estimate the body glycogen and the liver glycogen.

It was found that the injection of guanidine resulted in a marked rise in the lactic acid content of the blood and a decrease in the blood sugar. The glycogen content of the liver also decreased in some instances, but in others it remained level and the sugar content of the blood decreased rapidly. This prevention of the power to mobilize liver glycogen is regarded as one of the ways in which guanidine leads to a hypoglycaemia which when due to this cause may be relieved by calcium therapy. A second way in which guanidine leads to hypoglycaemia is probably through an interference with oxydative processes in the tissues by which the lactic acid is not burnt and is lost in the urine. This effect, which is more constantly seen than the prevention of mobilization of liver glycogen, is also combated by calcium therapy, but the mechanism has not been demonstrated.

—E. L. TAYLOR.

SEDDON, H. R., BELSCHNER, H. G., & KING, R. O. C. (1931). **Poisoning of Sheep by the Seeds of Burrawang (*Macrozamia spiralis*).**—*Vet. Res. Rep., Dept. Agric., New South Wales.* 1931. No. 6, 70-80. 4 photographs.

The authors report a remarkable case of heavy mortality in sheep in the Coonabarabran district as the result of feeding upon the seeds of *Macrozamia spiralis*, the so-called zamia palm or "burrawang" common in coastal vegetation and well known as an ornamental plant.

The red fruit cone of this plant splits when ripe, shedding roundish nuts

not previously regarded as dangerous although the young shoots of the palm had the reputation of producing a locomotor disorder locally termed "rickets" [quite unrelated to true rickets].

The sheep under consideration consisted of two mobs of 3,000 each, travelling about two days apart by road, and passing burrawang country. One mob merely skirted the fringe of the seed-strewn area but suffered mortality of 350 cases. The other had the opportunity of picking up seeds for about two hours and suffered the enormous mortality of 1,850 cases [or 62 per cent.] Of these the death rate on successive subsequent days proceeded 25, 82, 87, 72, 64, 62, 60, 50 and "a few still dying"—the first cases appearing about 18 hours after ingestion.

Experimental feeding tests clearly incriminated the palm kernels, the lethal doses of which were determined as 4 to 8 oz. for sheep and about 2 lb. for yearling cattle.

At the time of writing the toxin was still under investigation from the chemical standpoint but, on the basis of pathological lesions produced in the experimental animals, was described as a protoplasmic poison having a selective action on endothelial cells. Boiling the kernels in water for 15 to 60 minutes did not appreciably reduce toxicity although complete drying at 100° C. did do so.—H. H. GREEN.

MISCELLANEOUS.

BEDERKE, O. Tierärztliche Hochschulreformen in Sowjetrussland. [**Veterinary School Reform in Soviet Russia**].—*Berl. tierärztl. Wschr.* **48**. 321-323. [1 ref.]

Further reforms have been introduced into the veterinary curriculum during the last two years. The course provides specialist training for various fields of work, e.g. breeding, food control, disposal of raw materials, etc. All students are taught political economy, Leninism, German and gymnastics and continuous periods of practical training are provided for. The aim is to provide sufficient highly qualified veterinary surgeons, as well as the large number of men of lower standing, required to meet the needs of the country when the five years plan has reached completion.—F. BULLOCK.

JONES, T. Eaton. (1932). **The Horse: its Place in the Scheme of Transport**.—*Vet. Rec.* **12**. 287-289.

Comparative costs of horse and motor transport in the delivery and collection of goods are given and the balance is in favour of the former on short journeys necessitating frequent halts. The author maintains that the maximum efficiency in transport service can best be obtained by employing both horse-drawn and motor vehicles—the former for short journeys entailing many stops and the latter for long continuous runs. It has been proved in Liverpool that the most economical method of transporting refuse is to collect it in horse-drawn vehicles and to convey it to the dumps outside the city in motor vehicles.

It is pointed out that little attention has been paid in the past to the improvement and adaptation of horse-drawn vehicles to modern conditions. If a waggon with a low loading line, equipped with improved oiling and ball-bearing devices, were evolved horses would be able to draw much bigger loads and the cost per unit would be considerably lower than under present conditions.—C. J. R. LAWRENCE.

SCHMIDT-HOENSDORF, F. (1932). Tierpflege in Zoologischen Gärten. [**Care**

of Animals in Zoological Gardens].—*Deuts. tierärztl. Wschr.* **40**, 215-217.

The difficulties of keeping animals healthy in confinement are described. Hygiene is all-important, and the measures required differ according to the nature of the site. The open method has its drawbacks: very timid animals may even die from the excitement of being caught for treatment; others may have to be treated at a distance, e.g. for parasites with anti-parasitic fluid through a high-pressure syringe. Disinfection of the ground is as necessary as with domestic animals. Tuberculosis is a frequent disease, especially among apes. The article concludes with useful remarks on feeding.—F. BULLOCK.

- (1932). L'organizzazione del Servizio Veterinario del Governatorio di Roma. [Organization of the Veterinary Service in the City of Rome].—*Clin. Vet. Milano*. **55**, 220-221.

The Veterinary Service of Rome, which is the 4th division of Branch 8 (Office of Hygiene and Health) is composed of 22 veterinary officers classified as follows:—

1. A Veterinary Inspector, Chief of Service (Grade IV) in direct communication with the Health Officer, Director of the Branch.

2. A Veterinary Director of the Public Slaughterhouse (Grade V) directly subordinate to the Chief of the Veterinary Service.

For the cattle market (which comes under Branch XI, Food Service) the Director of the Slaughterhouse is responsible only for the sanitary part of the work, the administration being under a Director serving under Branch XI.

3. Twelve veterinarians of the 1st Class (Grade VII).

4. Eight veterinarians of the 2nd Class (Grade VIII).

The twenty inspectors are allocated as follows:—

(a) For the service of prophylaxis and veterinary attendance, the territory of the Governorship (city, suburbs and adjoining lands) is divided into seven zones each served by one veterinarian.

(b) For the service of statistics, supervision of dog kennels, and control of glands a veterinarian is posted on the staff of the Chief of the Division.

(c) For meat inspection at the slaughterhouse the Veterinary Director has directly under him eight veterinarians, to whom is also committed the hygienic supervision of the poultry and fish market.

(d) For the inspection of foreign meat there are two veterinary surgeons, with appropriate offices near the principal railway termini. This branch is directly under the Chief Inspector.

(e) The veterinary service at the cattle market is carried out by two veterinary officers in direct liaison with the Director of the Slaughterhouse.

(f) The hygienic and sanitary supervision of the sale and marketing of meat and fish, distributed through the various zones of the capital has, since the suppression of the toll barriers, been greatly increased, necessitating the services of almost all the governmental veterinarians, who report on every inspection to the Chief of the Veterinary Service.—F. BULLOCK.

OFFICIAL AND OTHER REPORTS.

CUMPSTON, J. H. L. (1931). Confédération australienne. Département vétérinaire. [Veterinary Department of the Australian Commonwealth].—*Bull. Off. internat. Epiz.* **5**, 766-768.

This is a report by the Director General of Public Health at Canberra concerning the attitude of the Australian Commonwealth to resolutions previously

passed by the Office international des Epizooties.

(1) **SANITARY BULLETINS.**—Information is issued within the Commonwealth every week. Once a fortnight would not be satisfactory. It is considered that the present monthly bulletin which is exchanged with the Dutch East Indies, Czecho slovakia, Denmark, Italy and South Africa is sufficient.

(2) **CERTIFICATES.**—The suggested form of certificate is not quite suitable for importations into the Commonwealth, for a properly certified animal might still be a "carrier," especially, for example, in contagious bovine pleuro-pneumonia. A specimen certificate is shown as in use between the Philippines and Australia.

(3) **EPIZOOTICS.**—Australia is free from the most serious epizootics, with the exception of contagious bovine pleuro-pneumonia, and this is being gradually eliminated. Australia is ready to agree to the model certificate in respect of exported cattle, but expects importing countries to state their conditions clearly.

(4) **ANTHRAX.**—This disease is not common in Australia, except in New South Wales, where there are 14 to 18 cases a year. All skins and hides are collected, sent to central depôts for classification into different qualities, and are then sold, so that a consignment may contain skins and hides from different regions, but they are always derived from animals killed as fit for human consumption. No skin or hide of an animal affected with anthrax, swine fever, or foot and mouth disease is accepted. This is guaranteed by a declaration by the seller and subsequent veterinary inspection. If the required certificates are not forthcoming the consignment must be disinfected either in the exporting country or on arrival.

(5) **TUBERCULOSIS.**—Research on BCG is in progress.

(6) **PARASITIC DISEASES.**—International action as suggested by the Office international des Epizooties would be welcomed.—F. BULLOCK.

--. (1932). Verslag van het Veeartsenijkundig Instituut over het Jaar 1930. [**Report of the Veterinary Institute (Buitenzorg, Java) for the Year 1930**].—*Ned.-Indisch. Blad. v. Diergeneesk.* **44**, 77-114. Several tables.

The institute was rebuilt in 1928 and 1929 and a description of it has been published [(1931). *Ned.-Indisch. Blad. v. Diergeneesk.* **43**, 403]. Accompanying photographs show it to be a very fine and well-appointed institution. Dr. BUBBERMANN, the director, is assisted by four veterinary bacteriologists—Drs. HUBER, LOBEL, KRANEVELD and PICARD and Dr. KRJGSMAN as veterinarian. The following is the report of the work done in the five departments of the institute.

DEPARTMENT FOR GENERAL DIAGNOSIS.—The results of the 1,262 examinations of material made during the year are set out in tables. Anthrax was diagnosed in 61 cattle and 83 buffaloes, haemorrhagic septicaemia in 46 buffaloes and 11 pigs and parablackleg in 19 cattle and 6 buffaloes. Other specific infections were also observed. Rabies was found in 50 animals (42 cases in dogs).

The results of pathological diagnosis are shown in tables arranged under headings according to body systems. Further work on bone and food analysis and individual disease outbreaks is reported under this section.

DEPARTMENT FOR SERO-DIAGNOSIS.—The complement-fixation test was exclusively employed in the diagnosis of glanders and positive results were obtained with 656 samples. Both this and the agglutination test were employed in the diagnosis of bovine contagious abortion and 190 positive tests are recorded. Tuberculin was mainly used for tuberculosis diagnosis but the complement-fixation test was used in some cases; avian tuberculin was used for the diagnosis of Johne's disease.

DEPARTMENT FOR THE PREPARATION OF SERA AND VACCINES.—This is a large

department; it undertakes the preparation of antisera and vaccines against haemorrhagic septicaemia of ruminants, swine and fowls and against anthrax and bovine contagious abortion, a dead vaccine being used for the latter; a vaccine is prepared against fowl pox and a culture filtrate vaccine against parablackleg.

DEPARTMENT FOR POULTRY DISEASES.—The diseases diagnosed are given in a table: they include fowl pox, infectious coryza, Newcastle disease described under the unsuitable name "pseudo fowl plague," leucaemia, blackhead, gout and other diseases.

ZOOLOGICAL DEPARTMENT.—The biology of *Tryp. evansi* in various hosts was studied and a biochemical study was made of the blood of infected animals, with reference to diagnosis by means of chemicals. Enzymes of trypanosomes also formed the subject of special work.

The biology of *Stomoxys* and *Lyperosia* received considerable attention. A list of parasitic worms, insects and protozoa observed during the year is included in this section and the whole report ends with a list of publications prepared by the staff of the institute during the year.—J. E.

— (1932). Verslag van het Veeartsenijkundig Instituut over het Jaar 1931. [Report of the Veterinary Institute (Buitenzorg, Java) for the Year 1931].—*Ned.-Indisch. Blad. v. Diergeneesk.* 44, 244-282. Several tables.

The animal accommodation of the institute was increased and certain new laboratory apparatus for use in serum and vaccine preparation was acquired. The number of the experimental animals used, 33 horses, 40 cattle, 41 buffaloes, 4 sheep, 3 asses, 2 pigs, one dog and a large poultry flock, was slightly less than during the previous year.

DEPARTMENT FOR GENERAL DIAGNOSIS.—1,049 examinations were performed. Rabies was confirmed in 30 animals (28 cases in dogs), anthrax in 8 cattle, 81 buffaloes, 13 horses and six goats, haemorrhagic septicaemia in 2 cattle, 2 pigs and 111 buffaloes and parablackleg in 23 cattle; other infective diseases were observed to a smaller extent.

Pathological, toxicological and chemical diagnoses were also performed and the results are given in tables. Notes are given on osteomalacia, anaerobic infections, "cascado"—a skin disease from which species of *Actinomyces*, *Microsporon* and *Trichophyton* were isolated—bovine colic ascribed to *Mimosa invisa* poisoning and a contagious peristomatitis in sheep [see this *Bulletin*, 2, 555].

DEPARTMENT FOR SERO-DIAGNOSIS.—Glanders was diagnosed in 492 cases, contagious bovine abortion in 138 cases. Three cases of anthrax were diagnosed by the Ascoli test. A note on tuberculosis is included in the report.

DEPARTMENT FOR THE PREPARATION OF SERA AND VACCINES.—There was no appreciable change in the work of this department from that in 1930.

ZOOLOGICAL DEPARTMENT.—The study of the behaviour of *Tryp. evansi* in the rat was concluded and a similar study of this parasite in the guinea pig approached completion. Work on the changes in the blood albumen, blood sugar and liver glycogen in the course of trypanosome invasion was also concluded and other sections of this study were continued. A tick survey and a study of *Rhipicephalus sanguineus* and *Boophilus australis* were undertaken. Dr. WINDRED finished the first part of his study of *Lyperosia exigua*. A list of parasites observed during the year concludes this section.

DEPARTMENT FOR POULTRY DISEASES.—Notes on the common infectious diseases as for 1930 are given. A few therapeutic preparations were tested.

The report concludes with a list of the scientific contributions published

during the year.—J. E.

- (1931). **Report of the Proceedings of the Thirty-fifth Annual Meeting of the United States Live Stock Sanitary Association.**—*J. Amer. Vet. Med. Ass.* 80. 289-305.

That part of the proceedings which is herein reviewed comprises the customary introduction and announcements, an opening address by the Assistant Secretary, United State Department of Agriculture, followed by an address by the President of the Association [CONNAWAY].

In his address the President states that the Association was originated to deal with Texas fever in 1897, when 14 states were under quarantine and isolated outbreaks were reported from others. A description follows of the methods adopted to control this outbreak. The legitimate functions of the Association are described, as well as the manner in which they differ from those of other veterinary associations. Reference is again made to Texas fever and its early history is touched upon.

Methods for the eradication of hog cholera are suggested in the concluding paragraph of the address.—G. W. DUNKIN.

BOOK REVIEWS.

STEPHENSON, Marjory. [Associate of Newnham College, Cambridge. Member of the Scientific Staff of the Medical Research Council.] (1930). **Bacterial Metabolism.** pp.xi + 320. London: Longmans, Green & Co. [8vo.] [18s.]

A welcome recent addition to the well-known series of "Monographs on Biochemistry" the aim of which is to cover the various special branches of the subject by a set of compact volumes each susceptible of independent revision as fast as knowledge advances.

The authoress, herself an established investigator in the field of bacterial metabolism, aims at choosing from the mass of data on bacterial activities those facts which best elucidate the essential chemical processes accompanying the life of the organisms concerned.

The task of presenting an intelligible picture of these processes is not an easy one since, as the authoress expresses it, "we are in much the same position as an observer trying to gain an idea of the life of a household by careful scrutiny of the persons and material arriving at or leaving the house; we keep accurate record of the foods and commodities left at the door and patiently examine the dust-bin and endeavour to deduce from such data the events occurring within the closed doors."

The reader will note her success with pleased surprise—the correlation of nutrients with metabolic products is excellent.

An extensive bibliography is critically surveyed and lucidly expounded, and an adequate subject index is provided. The contents comprise nine chapters—Introduction, Energy Relations and Fermentations, Respiration, Growth and Nutrition, Carbohydrate Breakdown, Synthesis of Polysaccharides, Protein Breakdown, Nitrogen Fixation, and the Autotrophic Bacteria.

The sections on nutrition and respiration, especially those on oxidation-reduction phenomena, should prove particularly useful to the general bacteriologist in search of enlightenment from the standpoint of physiology and chemistry, but the volume as a whole is so well balanced that it deserves a place on the shelves of every bacteriological and every biochemical laboratory.—H. H. GREEN.

BROWNING, Ethel. [M.D. (Liverpool). Assistant Pathologist to the Pickett-Thomson Research Laboratory, St. Paul's Hospital, London.] (1931). **The Vitamins.**—*Monograph Pickett-Thomson Res. Lab.* Vol. 1. pp. xxxii + 575. [over 3,000 refs.] London: Baillière, Tindall & Cox. [4vo.] [42s.]

The original purpose of this large monograph was to collect into one volume as much as possible of the existing literature on the subject of vitamins and to present a comprehensive account of the researches which have established the vitamin theory on its present basis.

That purpose has been broadly followed although the mass of material is so colossal that the authoress had, as she puts it, "to remain content with the endeavour to weave into a complete pattern those threads which have seemed most important to the continuity of the design."

The departure from the encyclopaedic intention, however, limits the use of the volume as a complete work of reference, while the numerous good short reviews which have been written on the subject, together with the comprehensive survey more recently issued by the Medical Research Council [(1932). "Vitamins: a Survey of Present Knowledge."—*Spec. Rep. Ser.* No. 167. H.M. Stat. Office] will perhaps prove more attractive to readers not concerned with the mass of literature as such.

The task undertaken single-handed by the authoress, of reviewing between three and four thousand original papers, might well have daunted a weaker spirit, so that criticism of weak spots is perhaps out of place. Nevertheless the veterinarian and agriculturalist will miss specific consideration of the vitamin requirements of the economically important domesticated animals, and consider that although the available information is often scattered in unlikely places there is yet sufficient of it to justify the search.

For example, although it is natural that the data on the vitamin requirements of the horse incidentally involved in CRAWFORD's work on equine osteoporosis in Ceylon should have escaped attention it is less to be expected that the early experiments on vitamin requirements of cattle (and incidentally horses) should escape discussion from a paper actually recorded in the bibliography and cited in the text—the Onderstepoort experiments of 1914-1915 being quoted on page 240 in reference to a point of no particular consequence (injection of distilled water into pigeons for control purposes) but the relatively important data on the feeding of cattle for over a year on polished rice being completely ignored.

In similar fashion the recent work (1929) of THURSTON, ECKLES and PALMER on vitamin C requirements of calves is referred to but the equally important earlier work (1926) of JONES, ECKLES and PALMER on vitamin A requirements is overlooked.

In all only five references to cows and cows' milk are included in the subject index, while horses and sheep are not mentioned at all. The statement on page 240 that "in the case of the cow the vitamin B requirement for lactation is unlike that of any other species of animal" will hardly go unquestioned without further work on other ruminants.

But on the general physiological, chemical and medical aspects of the subject-matter the work is exhaustive and a pleasing feature is the attention paid to the clinical and experimental aspects of the problems discussed. The discussion itself is clear and a connected account of the main properties of the vitamins is presented. The list of contents, occupying 23 pages, is well set out and this, together with the bibliography, a subject index and an author index, makes the volume easy to handle and indispensable to the shelves of the relevant reference libraries.—H. H. GREEN.

RIECK, W. [Lecturer at the Berlin Veterinary High School]. (1932). *Das Veterinär Instrumentarium im Wandel der Zeiten. [Veterinary Instrument Equipment through the Centuries]*. pp. viii + 116. 245 illustrations. [85 refs.] Berlin: Reprinted from Hauptner's Jubilee Catalogue. [4vo.]

This piece of special historical research forms a notable contribution to the history of veterinary science. The first 64 pages are devoted to a description of ancient veterinary instruments. In the fourth century A.D. veterinarians made use of similar instruments to those used in human surgery. e.g. the probe, spoon and spatula, straight knife (single and double edged), curved knife, tweezers and pincers, hooked and tubular instruments, needles, etc. There were also instruments special to veterinary surgery, e.g. the curry comb, firing irons for line and point firing, drenching horn, leather bottle and reed (for giving enemata), slings, hobbles, mouth-gag, etc. Dr. Rieck shows the manner and occasion of their use by quotations from the ancient writers. The Arabic veterinary manuscripts of the 12th century show, in addition to those mentioned above, a tooth rasp. In the 14th century ABOU BEKR used cupping instruments, paring knife, embryotomy knife, wooden castrating clams, and various firing irons. The Spaniards learnt from the Arabs and numerous water-colour illustrations from a 15th century Spanish manuscript of SALAMIELLAS' work on the veterinary art (now in the Bibliothèque Nationale, Paris) are reproduced, showing the use of instruments and appliances in different surgical operations in the 13th century. Among the authors quoted for the 17th century is our Michael HARWARD, a pioneer in abdominal surgery, from whose book "The Herdsman's Mate" (1673) is taken the use of the embryotomy knife. No mention is, however, made of the list of instruments illustrated in MARKHAM'S "Maisterpeece" (1610) which includes the fleam, lancet, probe, needle, line and point-firing irons, and a rude kind of scalpel and forceps.

The volume, which is generously illustrated, concludes with an account (pp. 65-112) of the development of the work of Hauptners as instrument makers from 1857 onwards.

COLYER, F. [K.B.E., F.R.C.S., L.D.S.] (1931). *Abnormal Conditions of the Teeth of Animals in their Relationship to Similar Conditions in Man*. pp. xi + 167. 217 figs. London: The Dental Board of the United Kingdom. [8vo.] [5s.]

The subject matter of this book has been exceedingly well treated and planned to get so much information into four lectures, although it seems to the reviewer somewhat of a pity that the publication of the book was not seized as an opportunity to enlarge on the lectures. The plan of the book has been to examine all abnormalities that occur in the teeth of wild and domesticated animals, including those due to mechanical injury, and to learn from the resulting reaction of the dental tissues something of the normal response of human tissues to similar abnormal conditions. The dental troubles of the domestic animals are somewhat superficially dealt with in comparison with the wealth of detail given for wild animals.

Usually the healing of injuries to the teeth of wild animals takes place without suppuration, even when the tooth is split through to the pulp. Teeth of continuous growth repair more actively than teeth of limited growth. It is found that in elephants the formative tissues of tusks, when disorganized by injury, may produce separate tusks and so it is suggested that injury at an early stage of tooth development may lead to a similar splitting up of the tissues and so play a part in the formation of composite odontomes. Caries of the teeth—that is, progressive destruction of the tooth tissue brought about by the agency of micro-organisms—occurs

in both wild and captive animals, but it is more common in the latter. Caries of these two groups of animals differs in type; that of the wild animal usually begins in the dentine or cement whilst that of the captive animal resembles that of man, in that it begins in positions which provide a lodgement for food. In spite of a current view there is no real evidence to support the contention that the enamel of wild animals is particularly highly calcified. Caries in the captive animal probably results from the change in the physical nature of its food, which change allows it to stay around the teeth and ferment. Caries in wild animals usually follows injury. Ungulates and carnivora, in the wild state, are practically free from caries. The disease is not uncommon in domesticated horses, usually occurring in the maxillary teeth. Caries is not known in the domesticated cat and is rare in the domesticated dog; it is questionable whether the condition sometimes following distemper of the dog, where the enamel is destroyed, should be regarded as caries.

From a study of hypoplasia or "under formation" in the teeth of animals it is suggested that two factors, one hereditary and the other associated with malnutrition, are responsible for this condition.

Paradental disease, or the loss of teeth as the result of the slow destruction of the supporting structures such as gums and bones, is studied and further knowledge is thereby obtained as to its aetiology and pathology.

Positional variations are examined in both wild and captive animals and it is found that certain types of variation seem to be associated with different genera. There is an inherent tendency to variation and this tendency is accentuated by altered environment. A further study of abnormal conditions of the teeth of animals would amply repay the research worker.

In conclusion it should be stated that the book is prolifically illustrated with a series of excellent photographs and figures. These are so useful and necessary to the text that the reader readily forgives the printer his one fault of putting the reading matter on shiny paper. The book is very good value for the price asked.—W. R. WOOLDRIDGE.

MARSHALL, F. H. A. [Sc.D. (Cambridge), D.Sc. (Edinburgh), F.R.S., Director of the Animal Nutrition Research Institute, Cambridge] & HALNAN, E. T. [M.A., also of the above Institute]. (1932). **Physiology of Farm Animals**. pp. xiv. + 366. 118 figs. Cambridge: University Press. [8vo.] [15s.]

This is a book on the physiology and nutrition of farm animals, written primarily for agricultural students and the authors express the hope that it may be of some value to veterinarians.

There is great variation in the quality of the different sections of the book. The sections on the biochemical functions of the animal body, particularly with regard to digestion, and those on the composition of foodstuffs and dietetics in general are good, whilst those on anatomy and "mechanical" physiology on the other hand are not so good and they are not free from errors and inaccuracies. These and one or two other sections fall far short of the standard required by veterinary readers and cannot be very instructive to readers such as agricultural students who have no experience of practical anatomy (dissection).

Many of the illustrations are borrowed from veterinary and other textbooks and are very helpful, but a few are badly chosen and badly reproduced. There are some entirely unnecessary and quite inaccurate and misleading illustrations of disease conditions of the lower leg of the horse.

There is a good index and the book is well printed.—J. E.